The CACNews

News of the California Association of Criminalists • Third Quarter 2018

The President's Desk

Who Would You Like to Be?

mey
TANN

CAC President

I thought, now that I am the CAC president, I am now "an individual who has the power, platform or ability to effect change." But I'd like to be more inclusive and make this a term of the membership.

Greetings....my fellow colleagues, friends and I daresay, (some) confidants. I have read many great articles from the CAC newsletter and I have definitely read many messages in the newsletter from the "President's Desk" so even before my term started as president, I knew I would have to produce four products worthy enough for print in the "President's Desk" portion of the *CACNews*. I am quite the procrastinator. I thought I had time to formulate this first quarter piece until I received an email from Mei, our CAC editorial secretary asking for my submission.

Going forward, for this first piece, I thought I would introduce myself and share my goals for the coming year. This would be difficult as I did not have any grandiose plans or specific goals in mind. My general goal was to not leave the CAC in a position worse than I had received it; hope to do as good of a job as those that have preceded me in this capacity. Yes, lofty goals indeed. In search of ideas and/or inspiration I turned to my family and friends one night at dinner. No ideas and/or inspiration made its way to print. I made a decision to skip my Saturday morning run/walk to work on putting pen to paper. Hoping it would help spark ideas and/or inspiration, I also went to the CACNews.org website under the resources tab in the *CACNews* Archive section and started to read again past President's Desk messages. I got sidetracked and ended up reading other things in there as well. If ever you find yourself with a bit of free time, I would recommend reading or re-reading an article or two in the CAC Newsletter. There are plenty of great pieces to choose from in there. John Houde and the editorial secretaries (past and present) do a wonderful job putting it together. Thank you to all the contributors who have contributed a piece or two or more to the newsletter. I would encourage all members to contribute to the CAC Newsletter. Please share and pass on your knowledge. If you don't, who will?

I do my best thinking in the shower and while driving. Believe it or not, the initial idea and inspiration came from these two places. The idea stems from a response to one of Mei's question in a piece she did in the *CACNews* entitled "Inside the Criminalist...A Questionnaire."

Q: If not yourself, who would you like to be?
A: An individual who has the power, platform or ability to effect change

I thought, now that I am the CAC president, I am now "an individual who has the power, platform or ability to effect change." But I'd like to be more inclusive and make this a term of the membership. Everyone has the power, platform or ability to effect change. My term will be the "membership of the people." To varying degrees and in all aspects of our lives, in our jobs as criminalists or as an individual in our communities, we all have this ability. It is a call to action. Speak, share, act and participate. I encourage everyone to do this. After all, this is your Association. Your goals could be my goals for the next year. Share your goals and help shape the CAC.

In my acceptance speech at the last CAC seminar in Concord, I spoke of how I am not much of an orator. I thanked the Contra Costa County Sheriff's Office Crime Laboratory for their hard work in hosting a great meeting. And I thanked the membership for entrusting me and giving me the opportunity to represent them and the CAC as their president. At this time, I would like to do the same and thank all of you. I hope to represent you well.

Mey

The CACNews
www.cacnews.org

THIRD QUARTER 2018

The *CACNews, ISSN 1525-3090,* is published quarterly (January, April, July, and October) by the California Association of Criminalists (CAC).

The CAC is a private foundation dedicated to the furtherance of forensic science in both the public and private sectors.

Please direct editorial correspondence and requests for reprints to the editorial secretary.

Notice to Contributors: We publish material of interest to our readers and are pleased to receive manuscripts from potential authors. Meetings and course announcements, employment opportunities, etc. are also solicited. Advertisements are also accepted, although a fee is charged for their inclusion in *The CACNews*. Please contact the advertising editor for further information.

Submissions should be made in the form of Windows compatible files on CD or by e-mail. Alternatively, text files may be saved as plain ASCII files without formatting codes, e.g. bold, italic, etc. Graphics, sketches, photographs, etc. may also be placed into articles. Please contact the editorial secretary for details.

The deadlines for submissions are: December 1, March 1, June 1 and September 1.

Workshop FST
CHP DUI instructor Rick Horrocks administers field sobriety tests to workshop volunteer Owen Goodrum at the Alcohol Impairment study conducted during the Spring seminar. More photos inside.

INSIDE

Awards Banquet Proceedings

(top r) President Vincent Villena presents Angela Freitas with a CAC Service Award for her work on the Seminar Planning Committee. (*bottom r*) Outgoing CAC Past President Brooke Barloewen accepts her Service Award for her tenure on the Board of Directors. Additional awards were announced to the membership including Chad Eyerly who won the Ed Rhodes award. The full member lottery was won by Jonathan Charron and service awards were given to Brooke Barloewen (Scholarship), Amanda Davis (Scholarship), Kenton Wong (Alcohol Review), Ann Murphy (Scholarship), and Stephanie Callian (Seminar Planning).

New Study Group Pricing Announced

As an appreciation for members and in an effort to attract more interest in joining the association, the CAC board has announced a new pricing structure for CAC-sponsored study group meetings. CAC members will pay nothing to attend and nonmembers will be charged $15. In both cases lunch will be provided.

Every seminar begins with the CAC Board of Directors meeting to discuss policy and address the concerns of the membership and the profession. (clockwise from left) Regional Director South Jamie LaJoie, Immediate Past President Brooke Barloewen, Regional Director North Cindy Anzalone, Recording Secretary Gunther Scharnhorst, President Vincent Villena, Treasurer Helena Wong, Editorial Secretary Meiling Robinson, President Elect Mey Tann and Membership Secretary Megan Caulder.

The Winds of Change

meiling
ROBINSON

CAC Editorial Secretary

Transitions are notoriously hard but are also marked by light—energy is consumed but is also released.

As you move through this life and this world you change things slightly, you leave marks behind, however small. And in return, life— and travel— leaves marks on you. Most of the time, those marks— on your body or on your heart— are beautiful. Often, though, they hurt.

—Anthony Bourdain

Summertime and the living is easy….

It is a well-known fact that all writers inevitably reach a point where they struggle to find the right words; either have no words to express or simply lack the inspiration necessary to compose. For me, this is a period of great contemplation and impatient repose. A frustrating phase, yet somehow strangely welcomed for its renewing qualities—a time to relish in the anticipation of the turning of the tide.

Similarly, summertime is like this for me, no movement either way. Like slack water. Like the old adage, slow and sweet like molasses. My many desires to read, listen to music, and simply indulge in long days and warm nights near the water or out on the sea sailing, are potent. I give in to the mental idleness. Shrugging off writer's block, I reach for some fizzy gift from Dionysus to drone out the voice of the erudite scholar within beckoning me back down the path towards wisdom. I will choose to be present here in the unstressed waters, in "the stand of the tide," even if it's only for brief a moment.

Transition as a verb

Here in the sunset of my term as editorial secretary, it is both ironic and fitting that I find myself in this figurative slack. As the time for me to transition out of my service on the Board approaches, I am both welcoming and rejecting this transition. With only three issues left after this, I contemplate what I have accomplished, what more I want to accomplish, and what more I need or should write. In my time thus far spent as editorial secretary I have not received many "Letters to the Editor." I'm not sure if that's a reflection on me and my unsuccessful attempts to instill conversation, or whether it's just the sign of the times. Regardless, it is my sincere hope that some of the members reading this issue will respond.

Transition seems to be at the heart of this quarter's issue. We have transitioned from President Vincent Villena, who is our organization's first Asian American male president to our new president, Mey Tann, our first Asian American female president. Certainly, Immediate-Past President Villena has brought our membership to the precipice of somewhere new and exciting. His commitment to educational outreach and push for more technological engagement, I believe, will foster a new generation of criminalists towards contributing to and participating in the development of the CAC. The future of any profession is indeed shaped by those who practice it. I believe our new CAC president's perspective and dedication will help rekindle the spark of romance and re-commitment to our organization. Together their passion for the CAC is inspiring. Standing tall on the shoulders of those that came before them, they are beacons for us all.

In this issue, we're also revisiting the discussion of the transition of the profession and practice of forensic science from that of a generalist approach to a specialist approach. Almost twenty years ago, at the dawn of the new millennium, the membership was embracing a moment of introspection and deliberating on the future of our profession. It was difficult to discuss then and perhaps still is. Yet here we are now, having transitioned and transitioning still, with the crux of it all being whether or not we as a profession are transitioning towards being better or worse

cont'd on next page

off? How do we reconcile the rift in opinions? This unsolved question that has for so long been a point of contention, arguably is debilitating our ability to finally transform beyond this dichotomy of conditions. Perhaps we should stop begging the question and make better arguments? In careful examination of these transitions we can learn to fully understand new or differing perspectives that have brought us here to this new tidal stream.

Transitions are notoriously hard but are also marked by light—energy is consumed but is also released. I hope the light in this issue is easily found and embraced. We will be embarking out of the unstressed waters to an uncomfortable place for many. It is my hope that some will actively read this issue and the issues to come and will undergo their own period of transition, whether it be personally or professionally. It is only through this growth that we as individuals and as an organization may hope to develop and reach new heights. I will also be seeking to embrace my own transition.

Mei

Visit the CAC Store

CAC LUGGAGE TAG

Click picture for larger view

CAC logo on one side, "California Association of Criminalists" on the other, and durable white tag on the inside. Who would mess with your luggage when you're sporting this luggage tag?? | MORE INFORMATION

Manufacturer's Description:
* 2.5" X 4.5"
* Inside features a Tyvek ID card sewn on inside
* Clear plastic loop to attached to your luggage
* 100% woven polyester fabric
* The outside features white printing on blue background

$6.00

ADD TO CART

CAC LOGO CERAMIC MUG

White, ceramic, 12-ounce mug featuring the CAC logo on one side and the famous chalk outline slogan "When Your Day Ends... Ours Begins."

No morning should begin without it!

$3.00

ADD TO CART

BEACH TOWEL

CAC Logo Beach Towel, Sized 35" x 60", 100% Cotton, IvoryTouch Screen Print (White) featuring the "California Association of Criminalists" and the famous chalk outline.

These are Navy Blue towels and the lettering/design is white.

$30.00

ADD TO CART

TRAVEL MUG

A great travel mug with the CAC Logo printed in Kelly Green ink.

Manufacturer's Description:
* 20 oz, double wall, polypropylene
* Threaded lid
* White gift box included
* Dishwasher and microwave safe
* Measures 8 1/4"H x 3 5/8"W.

$6.00

ADD TO CART

Outerwear

TRACK JACKET #2 by North End

Light-weigh yet warm and comfy zip-up track jacket featuring the CAC Logo on the left chest.
Product Specs Sheet | Sizing Chart

Manufacturer's Description:
* Contrast panel colors and bold piping accentuate style details
* 100% polyester
* Full zip jacket
* Adjustable draw cord at hem
* Inner side seam cord holder to safely secure draw cord
* Lower zippered security pockets for safely stowing valuables
* Ezem System ®

$40.00

Color: Navy Blue
Size: Small

ADD TO CART

TRACK JACKET #1 by North End

Light-weigh yet warm and comfy zip-up track jacket featuring the CAC Logo on the left chest.

PLEASE NOTE: These jackets seem to be larger than they indicate. For example, if you normally wear Large, consider ordering Medium. Sizing Chart

Manufacturer's Description:
* 100% polyester
* Full zip jacket
* Contrast raglan sleeve piping
* Contrast shoulder and sleeve stripes
* Matching rib knit cuffs, under collar and waistband
* EZEM System, Easy care

$40.00

Color: Navy Blue
Size: Small

ADD TO CART

ZIP-UP HOODED SWEATSHIRT by Hanes

Classic full zip hooded fleece that's crafted for keeps with low-pill, high-stitch-density fleece. Features a navy blue embroidered CAC logo on the left chest. Black is blank.

Manufacturer's Description:
* 85% Cotton/15% Polyester NuBlend® fleece
* 1lb, 9oz
* Outside, it's cotton rich for breathable comfort
* Inside, it's pure plush cotton for soothing softness
* Roomy front pockets and full zip front
* Jersey-lined hood helps block out wind and chill
* Cozy stretch ribbing trims cuffs and relaxed hem
* Imported

$36.00

Color: Heather Grey
Size: Small

ADD TO CART

www.cacnews.org/catalog/

Youth Clothing

INFANT T-SHIRT (by Precious Cargo)

Click picture for larger view

The T-Shirt that started it all... FOR BABIES! Featuring: FRONT: California Association of Criminalists, and BACK: The chalk-outline design and *"When Your Day Ends... Ours Begins."*

Manufacturer's Description:
* 4.1-ounce
* 100% ring spun combed cotton
* Large rib neck for easy on-off
* Double-needle hem and sleeves for durability

$8.00

Color: White
Size: 12 months

ADD TO CART

YOUTH T-SHIRT (by Port & Company)

Click picture for larger view

The T-Shirt that started it all... FOR KIDS! Featuring: FRONT: California Association of Criminalists, and BACK: The chalk-outline design and *"When Your Day Ends... Ours Begins."*

Manufacturer's Description:
* 6.1-ounce 100% cotton
* Taped shoulder to shoulder
* Coverseamed neck
* Double-needle hem

$10.00

Color: Royal Blue
Size: X-Small

ADD TO CART

INFANT ONESIE (by Precious Cargo)

A white infant onesie featuring the now famous CAC Store slogan: *"When Your Day Ends... Ours Begins."*

Manufacturer's Description:
* Overlapping shoulders and a 3-snap bottom closure
* 4.1-ounce, 100% ring spun combed cotton
* Rib knit lap shoulders, cuffs and leg openings
* 3-snap bottom closure

$8.00

Size: 6 months

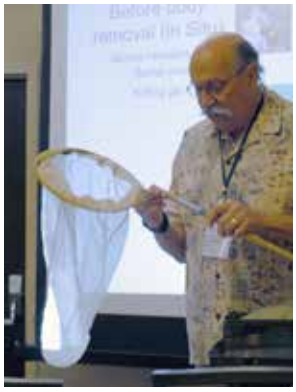
ADD TO CART

Spring 2018

The 131st CAC seminar theme was, "From Contra Costa With Love," and the 007 James Bond motif was in evidence everywhere one looked, from the faux tuxedo T-shirts worn by the support staff to the banquet table centerpieces. Even Monty Norman's jazzy Bond movie theme played during the vendor breaks.

But great entertainment is only a perk—the best part of a good CAC seminar is the reconnecting with colleagues, the making of new friends and getting some hands-on time with the latest products in the forensic science universe.

Beginning with two days of workshops and wrapping-up with an update on the Golden State killer case, this seminar was neither shaken nor stirred, but was truly a Casino Royale.



Dr. Robert Kimsey demonstrates the proper technique for collecting and preserving insect evidence at the forensic entomology workshop.

Tuesday was filled with workshops including "Officer Involved Shooting", "DNA", "and "Good Weighing Practices." But the star of the show had to be the Alcohol Impairment workshop taught by two experts from the California Highway Patrol, Rick Horrocks and Travis Herbert. Four volunteers agreed to consume a measured quantity of alcohol and perform a battery of tests while their breath alcohol was periodically measured.


CAC REGISTRATION


KEEP
CALM
AND
CAC
ON


DNA Evidence in the
Sierra LaMar Case


Lisa Christine Valdez


Raffle
Tickets

The general session gets underway with introductions by the vendors, hosting agency and keynote speaker.





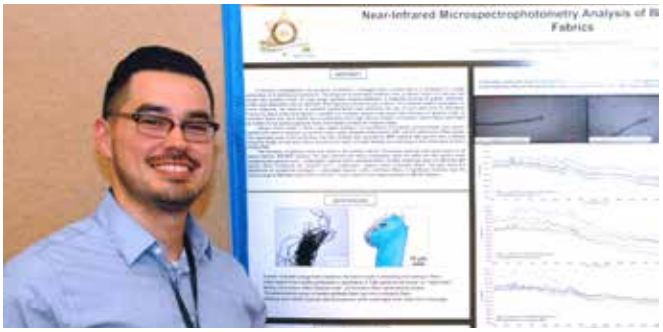


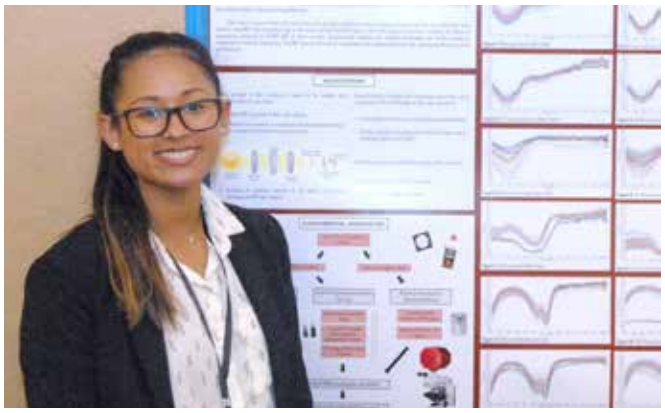


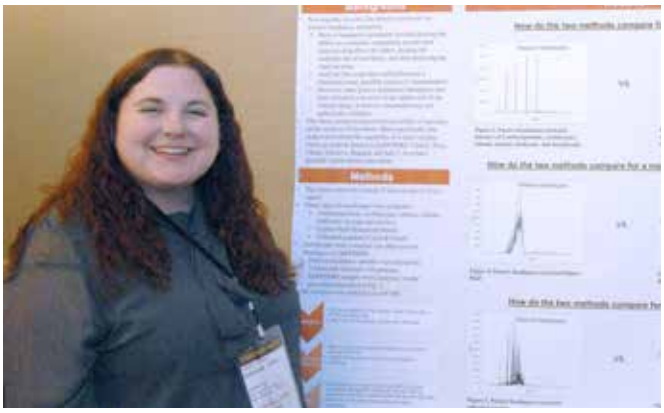


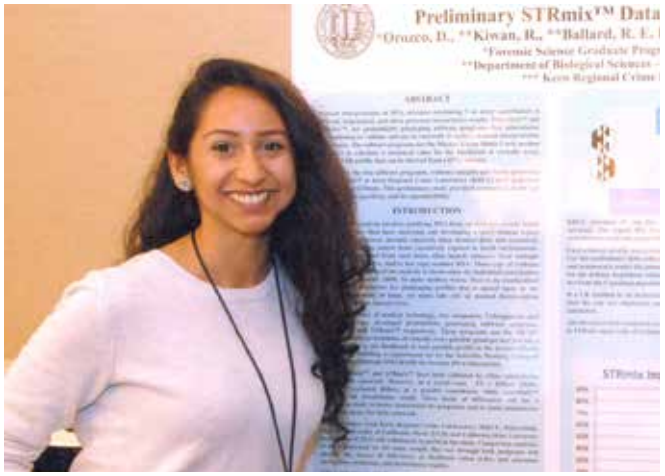


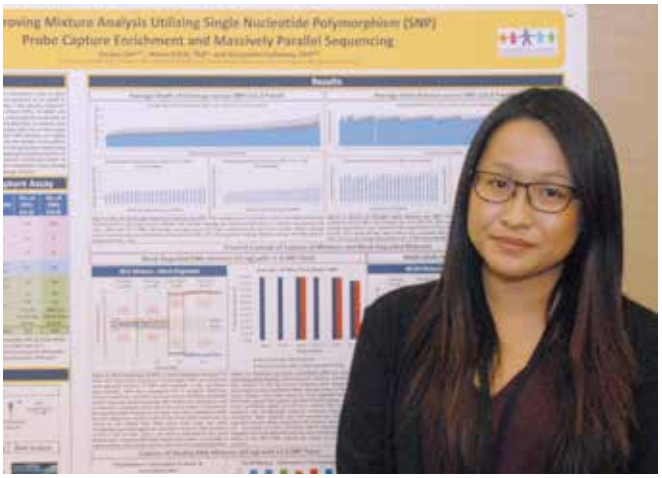

Poster Sessions

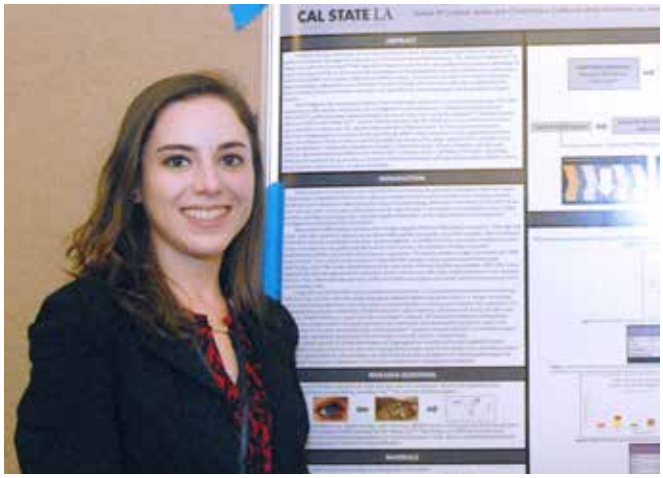


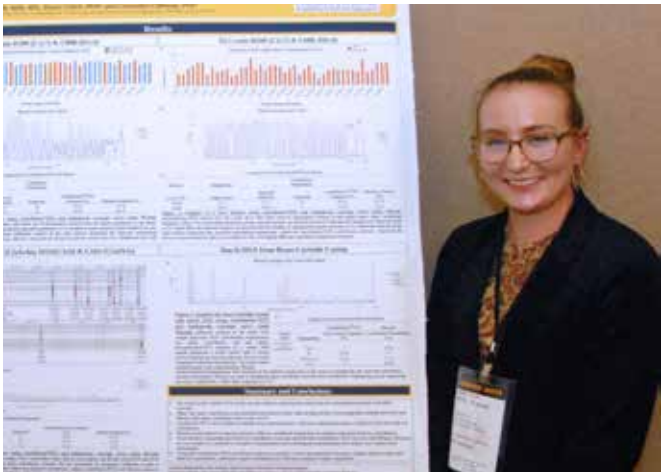


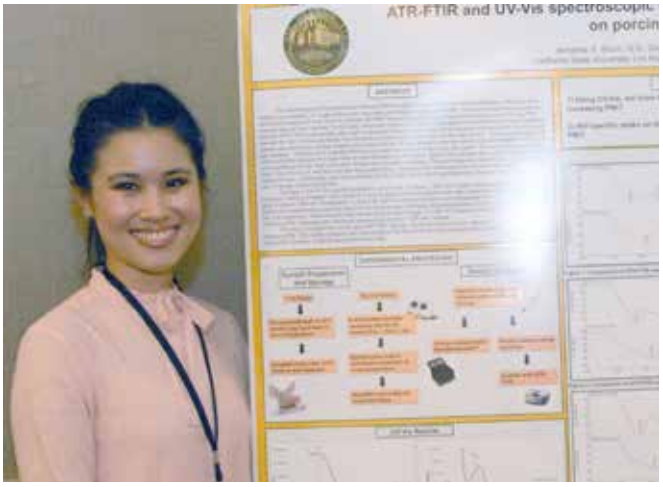



Preliminary STRmix™ Data


Probe Capture Enrichment and Massively Parallel Sequencing


CAL STATE LA





Outgoing CAC President Vincent Villena passes the traditional coconut to Mey Tann.


COME

DID YOU KNOW?

ETHICS PRESENTATION: SPRING SEMINAR 2018

KIM WILLEY

DID YOU KNOW?

AUG 2013: POLICY STATEMENT ON THE ETHIC COMMITTEE DUTIES & RESPONSIBILITIES

MAY 1985: BOARD APPROVED ETHICS COMMITTEE DUTIES & RESPONSIBILITIES

DID YOU KNOW?

THERE'S A WEALTH OF INFORMATION IN THE ETHICS SECTION OF THE CAC HOMEPAGE

DID YOU KNOW?

THE ETHICS COMMITTEE IS THE ONLY STANDING COMMITTEE MENTIONED IN THE CAC BYLAWS

DID YOU KNOW?

CAROLYN GANNETT COMPARED 10 PRINCIPLE CONCEPTS AGAINST THE ETHICS CODES OF 40 OTHER FORENSIC ORGANIZATIONS AND FORENSIC LABS

THE BYLAWS: AMENDED SEPT 2015
CAC IS TO ESTABLISH, MAINTAIN, AND ENFORCE A CODE OF ETHICS

- **ARTICLE 1-SECTION 14 OF THE BYLAWS:**
- **ESTABLISH,**
- **MAINTAIN,**
- **AND ENFORCE ****
- **A CODE OF ETHICS FOR CRIMINALISTS**

*****(MORE ON ENFORCEMENT LATER)***

GANNET'S FINDINGS:

10 ETHIC PRINCIPLES

1. BE OBJECTIVE
2. BE HONEST
3. BE FORTHCOMING
4. BE CONSERVATIVE
5. BE CORRECT
6. BE FAIR
7. COMMUNICATE PRECISELY, ACCURATELY & CLEARLY
8. DO PROPER TESTS
9. BE CONFIDENTIAL
10. BE RESPONSIBLE

25 LINE ITEMS

1. BE OBJECTIVE:

-IN ANALYSIS

-IN REPORTING RESULTS

-BY AVOIDING POTENTIAL CONFLICTS OF INTEREST

SUMMARY:

THE CAC WAS ONE OF 11 ORGANIZATIONS WITH THE MOST COMPREHENSIVE ETHICS DOCUMENTS

CAC CODE OF ETHICS

- **ADOPTED 61 YEARS AGO (1957)**
- **TWO PARTS:**

1. THE PREAMBLE:

-DEFINES THE ETHICS CODE

-CONTAINS GENERAL GUIDELINES ON HOW TO BE ETHICAL

2. SECTIONS 1 THROUGH 5: ETHICS RELATING TO:

-SCIENTIFIC METHOD, OPINIONS & CONCLUSIONS, COURT PRESENTATION, GENERAL PRACTICES OF CRIMINALISTICS, THE PROFESSION

-41 PARAGRAPHS UNDER THESE FIVE HEADINGS THAT PROVIDE SPECIFIC GUIDANCE ON HOW TO BE ETHICAL

OUR PROFESSIONAL CONDUCT IS DEFINED BY ONE OF THE EARLIEST COMPREHENSIVE AND HIGHLY REGARDED ETHICS CODES IN FORENSIC SCIENCE

*****A SIGNIFICANT REVISION WAS MADE TO THE CODE IN 1985. (SECTION 5: PART F)**

"IT SHALL BE ETHICAL AND PROPER FOR ONE CRIMINALIST TO BRING TO THE ATTENTION OF THE ASSOCIATION A VIOLATION OF ANY OF THESE ETHICAL PRINCIPLES. INDEED, IT SHALL BE MANDATORY WHERE IT APPEARS THAT A SERIOUS INFRACTION OR REPEATED VIOLATIONS HAVE BEEN COMMITTED AND WHERE OTHER APPROPRIATE CORRECTIVE MEASURES (IF PURSUED) HAVE FAILED." "

SECTION 5: PART F

PRIOR TO THE 1985 REVISION-YOU HAD NO OPTION BUT TO REPORT A PERCEIVED VIOLATION (EVEN IF ADDRESSED BY YOUR LABORATORY'S CORRECTIVE SYSTEM)

IN 1985-J. MURDOCK PROPOSED AND IT WAS ADOPTED, THE REVISION IN RED. THIS PROVIDED ANOTHER OPTION AND REMOVED THE OBLIGATION, IF CORRECTIVE MEASURES WORKED.

WHAT THE ENFORCEMENT PROCEDURES ESTABLISHED:

PURPOSES

- 1. ALLOWS ENFORCEMENT OF THE CAC ETHICS CODE
- 2. AFFORDS THOSE ACCUSED-DUE PROCESS
- THE CODE HAS BEEN TESTED SEVERAL TIMES SINCE AND HAS STOOD THE TEST OF TIME

SIGNIFICANT CHANGES

- IT MADE THE CAC BOARD OF DIRECTORS RESPONSIBLE FOR
- 1. EVALUATING THE RESULTS OF THE ETHICS COMMITTEE INVESTIGATION
- 2. DECIDING ON WHAT SANCTIONS, IF ANY, TO BE IMPOSED ON THE ACCUSED

ENFORCEMENT OF CODE OF ETHICS?

- ENFORCEMENT PROCEDURES DIDN'T EXIST UNTIL 1980
- THE PROCEDURES WERE DRAFTED BY J. MURDOCK AND CONTRA COSTA DDA GARY LEPPER (WHO HAD A WAY WITH WORDS)
- THE PROCEDURES WERE ADOPTED BY THE MEMBERSHIP AT THE CAC SEMINAR IN YOSEMITE IN 1980


CODE OF ETHICS ENFORCEMENT OF THE CALIFORNIA ASSOCIATION OF CRIMINALISTS

ETHICS ENFORCEMENT WORKSHEET?

A SIX PAGE BLUEPRINT OF ACTIONS TO TAKE WHEN AN ALLEGATION OF AN ETHICS VIOLATION HAS BEEN RECEIVED BY THE CAC


CALIFORNIA ASSOCIATION OF CRIMINALISTS ETHICS ENFORCEMENT WORKSHEET

WHY WERE ENFORCEMENT PROCEDURES WRITTEN?

BACKSTORY:

- 1979 AT THE CAC SEMINAR IN OAKLAND
- EXTENSIVE ETHICS INVESTIGATION WAS PRESENTED TO THE MEMBERSHIP
- AT THE TIME, THE ETHICS COMMITTEE INVESTIGATED ALLEGATIONS OF UNETHICAL CONDUCT AND DECIDED ON THE SANCTIONS IMPOSED ON THE ACCUSED.

THE CHALLENGE

- ELEVEN INSTANCES OF UNETHICAL CONDUCT AGAINST THE ACCUSED
- THUS, 11 PACKETS OF DOCUMENTS PREPARED BY THE ETHICS COMMITTEE
- PLUS-11 REBUTTAL PACKETS PREPARED BY THE LAWYER REPRESENTING THE ACCUSED
- 22 PACKETS TO REVIEW-THE EVENING BEFORE THE HEARING HELD BEFORE THE MEMBERSHIP

SUMMARY

THE CAC ETHICS AND THE ENFORCEMENT OF THE ETHICS CODES IS FIRMLY EMBEDDED IN THE CAC BYLAWS.

WE ARE PART OF ONE OF THE OLDEST AND HIGHLY REGARDED ETHIC CODES IN FORENSIC SCIENCE-CREATED 61 YEARS AGO

I ENCOURAGE YOU TO REVIEW THE AVAILABLE DOCUMENTS, THE CURRENT LIST OF DUTIES AND RESPONSIBILITIES AND CONSIDER VOLUNTEERING TO SERVE ON THIS VERY IMPORTANT COMMITTEE

WHY WERE ENFORCEMENT PROCEDURES WRITTEN?

THE CHALLENGE

- THE LAWYER SERVED A 35 PAGE LAWSUIT ON THE CAC CLAIMING THE CAC ENFORCEMENT PROCESS DID NOT AFFORD HIS CLIENT DUE PROCESS OF LAW
- MURDOCK WAS MADE RESPONSIBLE FOR DRAFTING A REVISED ENFORCEMENT PROCEDURE

THE OUTCOME

- HE WAS RIGHT
- THE ENFORCEMENT PROCESS WAS MODIFIED FOR THE 1979 HEARING TO THE LAWYER'S SATISFACTION
- ACCUSED FOUND GUILTY OF VIOLATING ONE OF THE 11 CHARGES & WAS REPRIMANDED
- MURDOCK'S DRAFT WAS APPROVED BY THE DEFENSE LAWYER AND THE 35 PAGE LAWSUIT WAS DROPPED

THANK YOU!!

ALL THOSE WHO HAVE COME BEFORE AND WHO HAVE UPHELD AND IMPROVED UPON THE PROCESS.

A SPECIAL THANK YOU TO JOHN MURDOCK FOR GIVING ME PERSPECTIVE AND AN APPRECIATION FOR THE HISTORY OF ONE OF THE MOST FUNDAMENTAL COMMITTEES IN THE CAC. BECAUSE OF THE COMMITMENT OF OTHERS, SUCH AS MURDOCK, WHAT MAKES A GOOD FORENSIC SCIENTIST HAS BEEN DEFINED.

Abstracts

of the

Spring 2018 CAC Seminar

DNA SESSION

SFPD STRmix Internal Validation: A Very Long Email Chain

Abby Burg, San Francisco Police Department Crime Laboratory

The SPFD Crime Laboratory recently completed work on its STRmix internal validation. This talk will unpack our probabilistic genotyping validation, including information on what kind of samples were needed, tips for time-management and streamlining, and more. Additionally discussed will be how a team effort, collaboration with the STRmix customer support team, and use of STRmix provided documents were especially beneficial to completion of the validation. As individual labs prepare to complete their own internal validations, they will need to make laboratory specific decisions regarding various areas of concern, including processes and procedures for interpretation, review and case file documentation prior to STRmix implementation. The SFPD's choices will be explained, with the caveat that use in casework is still new and procedures will continue to evolve with time and experience. It is our hope that this experience will provide a useful primer on validation as the forensic DNA analysis community moves along in the probabilistic genotyping direction.

STRmix Validation and Lessons Learned

Alisha Sandvig, San Diego County Sheriff's Department

I will briefly give an overview of our STRmix workflow, and then present 4 samples which had interesting issues or diagnostics in regard to the STRmix decons. I discuss each diagnostic as it comes up, how the issue was identified, and present what was done to resolve it.

Dedicated to the Proposition: CA DOJ's Systematic Approach to Proposition Formulation with STRmix v2.4

Kyle Duke, CA Department of Justice, Richmond Laboratory

The likelihood ratio (LR) is a ratio of probabilities, each of which is associated with a proposition. In the context of DNA mixture analysis using STRmix, typically the numerator of the LR represents the probability of observing the evidence if a proposition aligned with the prosecution's case is true, whereas the denominator represents the probability of observing the evidence if a proposition aligned with the defense's case is true. If forensic scientists were never in doubt about the structure of the prosecution and defense cases from the outset of their work on a case, the calculation of an LR would be a simple matter, but this is rarely, if ever, the reality of how forensic science interfaces with the legal system. Therefore, in validating STRmix, or any system of analysis that represents the weight of evidence with an LR, it is worthwhile to consider how one might systematically approach the formulation of LR propositions, given that the most applicable set of propositions at trial is often unknown at the time a report is written. CA DOJ's approach to proposition formulation with STRmix v2.4 was substantially influenced by a 2016 *Journal of Forensic Sciences* paper called "A Practical Guide for the Formulation of Propositions in the Bayesian Approach to DNA Evidence Interpretation in an Adversarial Environment" (January 2016, Vol. 61, No. 1). Our validation team appreciated the fundamental concepts put forth in this paper, although efficiently representing how they would be applied from case to case was more difficult than it appeared initially. This presentation will be a breakdown of the flowchart that CA DOJ ultimately generated to assist analysts with the process of formulating propositions for STRmix LRs, as well as its evolution from the first draft to the current version.

Reliability of Phenotype Estimation and Extended Classification of Ancestry of Middle Eastern, Pacific Islander, Native American, and Jewish Populations

Naomi Weisz, California State University, Los Angeles

In forensic biology, phenotype and ancestry estimations have received considerable attention due to their potential to provide investigative leads and aid in the human identification process.

The Illumina® MiSeq FGx(TM) in conjunction with the ForenSeq(TM) DNA Signature Prep kit is currently the only platform that produces genotypes of the CODIS-required STRs as well as provides phenotype and biogeographic ancestry estimations via phenotype- informative (piSNP) and ancestry-informative (aiSNP) markers, respectively. Although both markers have been developmentally validated for use in the field of forensic biology, there has been little data to determine the practical utility of these estimations to assist in the identification of missing persons using decedent casework samples.

We investigated the accuracy and utility of both phenotypic and ancestral estimations based upon the DNA sequencing of 300 decedent blood samples received by the Los Angeles County Department of Medical Examiner-Coroner. piSNP genotypes were translated into hair and eye colors using the Universal Analysis Software (UAS) on the MiSeq FGx(TM) and the Erasmus MC webtool, and the statistical accuracy of these estimations was evaluated in context with the reported characteristics of the decedent.

Similarly, estimations of each decedent's biogeographical ancestry, based upon the 56 aiSNPs, were compared to their reported ancestry to assess the efficacy of these markers in correctly predicting ancestry. This study reported on the capability of the FROG-kb database to adequately distinguish decedents beyond the Asian, African, and European global ancestries provided by the MiSeq FGx(TM) Universal Analysis Software's PCA plots. Specifically, FROG-kb was analyzed for its accuracy in distinguishing individuals from Middle Eastern, Pacific Islander, Native American, and Jewish populations.

A Comparison of Touch DNA Collection Methods from Spent Cartridge Casings using Probe Capture Next-Generation Sequencing

Symone Watson, University of California, Davis

DNA recovered from spent cartridge casings is traditionally collected with the double swabbing method with cotton swabs. However, epithelial cells may become trapped in the swab head matrix, affecting DNA yield during extraction. Also, the success of obtaining a searchable STR profile can be affected by DNA degradation and by copper induced oxida-

tive DNA damage. In order to improve DNA yield recovery and analysis success, alternative DNA collection and analysis methods are needed. In this study, three alternative DNA collection methods were compared to the conventional double swabbing method. Mitochondrial genome analysis was conducted on a subset of the samples using a probe capture Next-generation sequencing (NGS) method.

Touch DNA was collected from 173 spent 0.40 cal brass cartridge casings using one of four collection methods: double swabbing with cotton swabs, double swabbing with Copan FLOQswabs™, FTA® card scraping, and a soaking-swabbing method; then, the samples were extracted and quantified using a qPCR assay targeting two nuclear DNA markers (nDNA) and one mitochondrial DNA (mtDNA) marker.

Nuclear DNA was not detected in 52% of the quantified samples. Samples collected with cotton swabs, FLOQswabs™, and soaking-swabbing yielded significantly more nDNA than FTA® cards ($p<0.05$). Only 2.5% of the samples yielded enough nDNA to yield an interpretable STR profile. Based on recovered nDNA amounts, conventional STR analysis using capillary electrophoresis would most likely fail for a majority of the samples.

All touch DNA samples yielded detectable mtDNA amounts. Cotton and FLOQswabs™ had higher mtDNA copy number yields compared to soaking-swabbing and FTA® scraping. Statistically significant differences in mean mtDNA copy number were observed across all pair-wise comparisons apart from cotton vs FLOQswab™ samples ($p=0.32$). A total of 41% of samples yielded >2,000 mtDNA copies and were expected to exhibit full or partial coverage of the mitochondrial (mt)genome.

A probe capture NGS method was used to analyze a total of 19 samples (9 cotton and 10 FLOQswab™) that yielded >5,000 mtDNA copies. Nine FLOQswab™ samples exhibited full coverage of the mtgenome compared to only 1 cotton swab sample. Cotton and FLOQswab™ samples had similar mtDNA inputs, but cotton swab samples exhibited a lower average mtgenome coverage. The major haplogroups of 6 sequenced FLOQswab™ samples were consistent the reference haplogroups; however, none of the major haplogroups of the cotton swab samples were not consistent with the reference.

In conclusion, the alternative DNA collection methods did not improve the recovery of nDNA amounts from spent cartridge casings. nDNA yields were too low for STR analysis; however, sufficient mtDNA copies were recovered in a majority of the samples by double swabbing with cotton and FLOQswabs™. Overall the samples collected FLOQswabs™ resulted in higher coverage of the mtgenome, and there were a greater number of FLOQswab™ samples with major haplogroups that were consistent with the reference. Although similar mtDNA yields were observed, FLOQswabs™ may be a better alternative to cotton swabs for collecting touch DNA on spent cartridge casings for mtDNA analysis.

Characterization and Persistence of Vaginal Bacteria Underneath Fingernails

An Truong, University of California, Davis

For sexual assault cases involving digital penetration, probative DNA evidence from the victim's vaginal fluid could be under the suspect's fingernails. This type of DNA evidence can establish a direct link from suspect to the victim. However, the suspect could argue that the accumulation of the victim's DNA under the suspect's fingernails was due to casual or daily contact with the victim. A solution to this problem is to identify the body fluid as vaginal fluid using the presence of Lactobacillus bacteria species that are found natively in the vagina. Previous research has shown that is possible to identify vaginal fluid using the 16- S rRNA gene of *L. crispatus, L. iners, L. gasseri,* and *L. jensenii.* Also, 16-S rRNA can be used to identify bacteria that are associated with a specific part of the human microbiome such as the human skin. Resident flora that naturally occur on hands include *Staphylococcus, Proteus, Klebsiella*, and *Acinetobacter.*

Further research has shown Next-Generation Sequencing (NGS) technology can used in 16-S rRNA sequencing and classifying bacteria associated with the vagina or skin. The goals of this project are to (1) characterize the normal bacterial flora found underneath fingernails following digital penetration of the vagina and (2) study the persistence of vaginal bacteria underneath fingernails following digital penetration.

In this study, 80 samples were collected from four couples (AAAB, BABB, CACB, and DADB) at designated time points (baseline, 0 hr, 6 hr, 12 hr, 18 hr, and 24 hr) from underneath fingernails after vaginal contact. Experimental contact samples were collected on one hand and non-contact controls were collected on the other, all at the same time points. The DNA was extracted and then the 16-S rRNA gene was targeted and amplified. Then the samples were analyzed by NGS. From the data, there are three distinctive, observed patterns. The first pattern was that *Lactobacilli* were dominant (>60%) throughout all experimental time points as seen in one couple, CACB, from two trials. The second pattern was that *Lactobacilli* were rapidly replaced by Staphylococci as seen in two other couples, BABB and DABB. *Lactobacillus* can be seen at high frequencies (88-99%) in the beginning at vaginal baseline and 0 hour samples, but after 6 hours the dominant bacteria became *Staphylococcus*. For the three couples BABB, CACB, and DABB, *Staphylococcus* is the predominant bacteria genus observed throughout all control samples with frequencies ranging from 2- 97%. The third pattern was that bacteria distributions were highly variable in both non-contact and contact samples as seen in couple AAAB. Comparing the *Lactobacilli* frequencies of all samples, a frequency threshold of least 20% can give a reliable indication that a finger made vaginal contact.

Based on the results of this small study, it is possible to detect *Lactobacillus* at high frequencies after 24 hours; therefore, *Lactobacillus* could be used as a biomarker to determine vaginal contact since a *Lactobacillus* population of a minimum frequency of 20% can suggest vaginal contact.

The Tale of Two Co-defendants: Using Probabilistic Genotyping to Interpret an "Inconclusive" Mixture

Norah Rudin, Forensic DNA Consulting

Co-defendants were accused of illigal possesion of a firearm. Evidence from the firearm was typed by a public laboratory. The lab reported an indistinguishable mixture of at least three contributors. Because they only had historical tools available at that time, they correctly concluded an "inconclusive." A visual inspection revealed that no allelic drop-out was required to explain the presence of defendant 1, while quite a lot of drop-out was required to explain the presence of defendant 2. Probabilistic genotyping analysis using Lab Retriever resulted in dismissal of charges against defendant 2, while charges against defendant 1 were pursued. An admissibility hearing was held, resulting in a second positive result

for Lab Retriever. Interesting details that ultimately affected the verdict will also be discussed.

Updates of Progress

Sara Laber, Promega Corporation

The Spectrum CE System offers increased spectral capacity, which will allow analysis of existing 4-, 5- and 6-color multiplexes as well as a new family of 8-color multiplex STR systems; the first being 35GY which will be released around the launch of Spectrum. With the inclusion of additional colors, smaller, more numerous loci will increase a laboratory's chance of success with degraded samples. Additionally, improved multiplex configurations will provide more complete and informative results with inhibited casework samples, while the narrower range of product amplicon sizes will enable more consistent results with variable "direct amp" samples. The system also offers increased workflow flexibility with four continuously-accessible plate positions. This design improves laboratory efficiency by reducing scheduling conflicts, increasing overnight/weekend throughput and reducing the number of instruments needed in the laboratory. Lastly, the system's analysis software provides fast, reliable and accurate forensic data analysis. We will also discuss the Maxwell 48, MaxPrep Liquid Handler, and other product updates.

MythBusters: A Review of Lessons Learned from DNA Extraction Through Data Analysis

Ellen Crone, Thermo Fisher Scientific

So exactly how many Thermo Fisher Scientific engineers does it take to change an Applied Biosystems™ 7500 PCR System bulb? And do capillary arrays really have expiration dates? Those are the kinds of questions, myths and lab legends that will be addressed in this interactive and fun discussion that seeks to identify fact from fiction. We will collectively explore lessons learned throughout the forensic DNA analysis workflow from extraction through data analysis, uncovering useful tidbits of information direct from the product source that may even assist to push the limitations of the system.

Bode Armor and The Bode Vault: Secure Storage for Valuable DNA Evidence

Dan Watsula, Bode Cellmark Forensics

The collection of a reference sample from an individual's mouth results in more than just buccal cells being obtained from the donor. Naturally occurring oral microbial flora along with their associated enzymes can be co sampled and contained on the collection swab or device. Bacteria and enzymatic activity can have an impact on DNA stability especially in the presence of an uncontrolled or high humidity environment. The long-standing evidence mantra of store in a cool and dry place was designed to reduce bacterial flora and associated enzymatic activity.

Bode Cellmark Forensics has developed a twofold approach to mitigate these risks, application of Bode Armor post collection of a sample and long term storage in The Bode Vault. Bode Armor is an ISO 18385 Forensic DNA Grade DNA preservative solution that has been developed to enhance long term stability of buccal samples collected with the Bode Buccal DNA Collector. Bode Armor enhances stability of DNA samples by inhibiting bacterial growth and by inactivating harmful enzymes such as DNase I. The Bode Vault provides a controlled microenvironment that mitigates high humidity through the use of foil pouches and desiccants.

The developmental validation of Bode Armor indicates compatibility of the preservative and the megaplex amplification kits. No interference and complete concordance in terms of accuracy, precision, sensitivity, and reproducibility was observed between samples with and without Bode Armor. Compatibility was achieved with the traditional extraction, quantification, amplification procedures as well as the emerging direct amplification procedures.

Developmental studies involving Bode Armor and The Bode Vault have occurred in both real time and through accelerated testing. At a time point of 4 years of storage at room temperature and uncontrolled humidity, a degradation index of 1 or less was observed on average for all samples tested. Complete DNA profiles that met all operational guidelines were obtained from all samples indicating little to no degradation. By combining Bode Armor with The Bode Vault in an accelerated aging study, a complete profile was obtained from buccal samples stored for an estimated thirty years at room temperature.

As DNA databases continue to grow and contribute to helping law enforcement investigate crimes, the effect of collection and storage of the DNA samples should be reevaluated. Uncontrolled storage conditions such as high temperature and increased humidity could compromise the DNA sample. Bode Armor and The Bode Vault provide a solution that enhances stabilization of DNA for long term storage of reference samples.

Direct to DNA with the Qiacube

Maria Cownan, San Francisco PD Crime Laboratory

In November of 2017, the San Francisco Police Department's DNA unit began routine use with Qiagen's automated differential extraction robot, the Qiacube. This automation was introduced in tandem with a "Direct to DNA" approach supported by SWGDAM's 2016 Recommendations for the Efficient DNA Processing of Sexual Assault Kits. Instead of relying on the results of less sensitive serological tests to triage samples, every sample is processed with a differential extraction.

Since implementation, the number of samples processed has increased as much as 50%, however, the turnaround time numbers have remained constant. The Qiacube has bolstered the workflow by lessening the demands on the analyst and has been critical in the change to a more thorough examination approach of Sexual Assault Kits.

Automated Differential Digestion Using the Versa Robot

Helena Wong, Oakland Police Department Crime Lab

This presentation will focus on the use of the Versa 1100 as an automated liquid handler for processing the differential digestion protocol. Topics will include why we selected the Versa, the functions of the Versa, how we utilized and implemented it to fit our protocol, and how it has affected our casework.

Effective Differential Extraction and Recovery of Sperm DNA from Sexual Assault Evidence Samples Utilizing Novel Matrix Materials

Andrew Loftus

We report a novel sperm recovery method funded by an NIJ research and development grant, which effectively separates sperm cells from the epithelial cell DNA in sexual assault evidence. When extracting DNA from sexual assault samples, forensic laboratories perform a differential extraction, which is a time-consuming, skill dependent, and laborious process that can result in low quality, mixed DNA profiles that are frequently difficult to interpret. The conventional manual differential extraction process has a large number of sample transfers and manipulations that increases the risk of sample loss and/or contamination. Additionally, the Erase Sperm Isolation method, which can provide clean male profiles results in very low yields due to sample loss during processing according to a recently published article. Our work addresses these problems by utilizing a nanotechnology derived polymer separator that functions to effectively capture sperm cells, while enabling efficient flow through of digested epithelial cell DNA. This method provides an efficient, simple, and fast process which significantly increases a forensic laboratory's ability to obtain "clean" sperm fraction DNA profiles while minimizing sample manipulations, thus providing a rapid, reproducible procedure that is easy to implement in a single-tube format.

We have designed a sample processing vessel to capture the sperm and have optimized the process with effective digestion and wash steps such that epithelial and sperm DNA can be effectively separated and collected, resulting in unambiguous, single-source sperm DNA profiles. Evaluation of the effectiveness of this process was performed using mock, dried rape kit swabs containing both epithelial and sperm cells. The optimized process effectively recovered over 90% of the sperm DNA which was then processed for STR analysis, resulting in a simple process that provides high quality male DNA profiles. This novel technology, when compared to current methods for differential extraction, allows for more efficient and reproducible recovery of sperm DNA from sexual assault evidence samples.

GENERAL SESSION

Innocence and Forensic Science: Working Together for Justice

Linda Starr and Rick Walker, Northern California Innocence Project

Working with forensic scientists, lawyers at the Northern California Innocence Project (NCIP), have been able to use DNA evidence from a crime scene, analysis of chemical compounds from a fire, and reexamination of statistical analysis of microscopic hair comparison results to demonstrate wrongful conviction. Along with Rick Walker, a man freed through the use of forensic science, NCIP Executive director Linda Starr will discuss how the organization works with forensic scientists to achieve justice.

A Two-year Study of 9-Tetrahydrocannibinol (THC) Concentrations in Drivers - Part 2: Physiological Signs on the Drug Recognition Expert (DRE) Examination

Kari Declues, Orange County Crime Laboratory

Whole blood samples were examined for THC over two years in drivers suspected of driving under the influence. Part one of the study examined the link between THC and performance on field sobriety tests. This portion examined objective signs, eye examinations, and physiological indicators and their relationship to the presence of THC. Several objective signs were excellent indicators of the presence of THC, including red eyes (94%), droopy eyelids (85.6%), affected speech (87.6%), tongue coating (96.2%) and odor of marijuana (82.4%).

Dilated pupils (room light) were exhibited by 63.6% of THC positive subjects. THC positive subjects had either rebound dilation or hippus in 88.8% of cases. Pulse and blood pressure (BP) were evaluated to determine any correlation with THC. An increased pulse rate correlated well to the presence of THC (88.5%), but not THC. BP did not correlate to THC and was also a poor indicator of THC in the blood (50% high).

Challenges Toxicologists Face when Testifying on THC DUIDs

Mark Burry, Santa Clara County Crime Laboratory

With the recent legalization of recreational THC use in California, courts will likely see an increase in THC-DUID cases. This presentation will outline some of the challenges toxicologists face when testifying on these cases and introduce ideas on how to tackle these challenges.

A Case Study: Sierra LaMar

Michelle Bell and Trevor Gillis, Santa Clara County Crime Laboratory; Herman Leon, Santa Clara County Sheriff's Office; and David Boyd, Santa Clara County District Attorney's Office

15-year-old Sierra LaMar failed to make it to school on March 16, 2012. Five years later, Antolin Garcia-Torres was found guilty of her murder, even though Sierra's body has not been found. What started out as simply a missing person eventually turned into a high-profile, months-long homicide trial. This multi-disciplinary case incorporated examinations including Crime Scene, Biology/DNA, Trace Evidence, Fingerprints, Digital Forensics, Questioned Documents, and more. The investigation and examinations will be discussed, including all the twists and turns and the lessons learned.

Forensic Entomology and its Potential Role in Fire-Death Investigations: An Initial Study

Robert B. Kimsey, Department of Entomology, University of California, Davis

One does not immediately think of insect evidence as playing a significant role in homicide investigations where fire destroys the decedent to a greater or lesser degree. Yet in the possible histories of fire-related homicides, several scenarios in which periods of time long enough for insect populations to develop potentially exist, separating either death and burning, or burning and discovery of the remains, or potentially integrating both these periods into a single history. But do insect populations survive the burn, and if so, where, in what form, and under what conditions? Does a characteristic delay in establishment of populations following a burn occur, and can such populations be distinguished from those that may survive the fire? These constitute a few of the questions we asked in an exploratory effort to determine if insect evidence may have probative value in cases of fire-related homicide.

Using four human decedents, one set aside as a control, we executed an experimental scenario including both periods: initial exposure followed three days later by a simulated "road-side, burn-pile" attempt to destroy the remains with fire, followed by "discovery" three days following the burn event. We prepared, wounded, and dressed the decedents identically, combined each with the same amount of rubbish fuel, and burned them using the same amount and kind of accelerant, permitting the fires to burn to extinction. We did not burn the control. We monitored and sampled insects on the decedents more or less continuously following exposure until the time of "discovery". We found that the periods of delay prior to first fly landing and first egg laid averaged 15.2hrs (SD = 0.42, N = 4) and 21.2hrs (SD = 0.90, N = 4), respectively, following initial exposure and 17.1hrs (SD = 0.78, N = 3) and 18.9hrs (SD = 3.41, N = 3) for the period following the burn and prior to discovery (Elapsed time includes a 9:32 hr. dark period). There did not appear to be a characteristic additional delay in infestation following the burn. Evidence of prior infestation occurred in two of the decedents- maggots surviving in the ear canals in one case and in cracks in the ground underneath the remains in another.

Thus, infestations survived temperatures of more than 776 °F (413.3°C), the minimum highest temperature measured in the fuel piles, in each body and under each body (776 to 1489°F) (413.3 to 809.4°C). One life history stage of age separated pre- and post-burn cohorts of maggots in one of these decedents, indicating that determining two minimum periods of infestation, one beginning after death and the second commencing following a burn may be possible in some cases of fire-related homicide. Thus, the Forensic Entomologist may provide investigators with estimates of the periods during which death and the subsequent fire occurred.

The JFK Assassination as a Shooting Incident Reconstruction Learning and Planning Exercise

Lucien C. (Luke) Haag, Forensic Science Services

More than half a century has passed since November 22, 1963 assassination of John F. Kennedy. It is claimed that there are well over 1000 presentations and descriptions of the assassination in the form of books, articles, movies, and television specials that have appeared since this historic and horrific crime, most of which have dealt with various conspiracy theories or criticisms of the original investigation.

This presentation will review the physical evidence and the relevant, undisputed facts regarding the assassination of President Kennedy and the near-fatal wounding of Texas Governor John Connally. This will be followed by examples of the numerous exterior and terminal ballistics tests carried out by Luke and Mike Haag over a 3-year period regarding the very unusual rifle and ammunition associated with the assassination.

The presentation will conclude by using this case as a learning exercise and model for designing a thoughtful, logical and orderly application of contemporary forensic specialties to similar crimes in the future. Contemporary and emerging techniques will be described which were not available in 1963. These will include thermal imaging, gunshot residue analysis, elemental mapping, trace evidence, the appropriate application of DNA sampling, ballistic acoustics, firearms identification by virtual microscopy, and bullet lead analysis.

Trace Evidence on Bullets: Its Potential Importance and Reconstructive Value

Lucien C. (Luke) Haag, Forensic Science Services

There are instances in which the association of a fired bullet from a shooting scene with a particular firearm is of little or no importance. Rather, the location, nature, and sequence of damage suffered by bullets during such events as ricochet, perforation of one or more intermediate objects, and/or impact with bone in a gunshot victim is of the greatest importance, yet often considered merely a hindrance to identification efforts by the firearms examiner. These areas of damage, their character, order of deposition, and associated trace evidence embedded in the bullet can provide critically important reconstructive information. Examples include embedded particles of glass, paint, mineral material, asphalt, bone, tissue, hairs, and clothing fibers.

Case examples will be presented in which trace evidence on bullets was the most important finding, and resulted in the resolution of one or more disputed issues in each shooting.

Absence of Evidence? - A Shooting Incident Reconstruction

Alexander Jason, ANITE Group

An officer-involved shooting incident occurred during a bizarre burglary. Although much of the activity was captured on several video cameras, the actual shooting incident was not.

The absence of gunshot residue (GSR) evidence became a central issue providing a foundation for civil litigation. This presentation includes video from the incident and demonstrates how the analysis of video frames before and after the shooting was used to make significant determinations -- and how the thorough evidence collection at the scene led to a resolution.

A Closer Look at PCAST's Analysis of Firearms and Toolmarks

Todd Weller, Weller Forensics

In September 2016, the President's Council of Advisors on Science and Technology (PCAST) released a 160-page report that analyzed the "scientific validity" of six forensic science disciplines. Firearm & Toolmark Examination was one of the disciplines included in this report. PCAST concluded, with regard to Firearm and Toolmark Examination, that "… firearms analysis currently falls short of the criteria for foundational validity, because there is only a single appropriately designed study to measure validity and estimate reliability." PCAST's primary focus was on examiner performance, as measured by error-rate ("black box") studies. Unfortunately, their error rate analysis contains numerous errors. This presentation will provide attendees with an overview of PCAST's analysis and will highlight areas where the author has found serious flaws in their report.

Using Methylation Patterns to Determine Origin of Biological Material

Peter St. Andre, Amy Lee, and Mark Powell, San Francisco Police Department Crime Laboratory

Recent research efforts have led to the development of new assays to identify body fluids using epigenetic-based markers, such as DNA methylation. DNA methylation presents a promising methodology as it is tissue specific, provides quantitative results, and has greater long-term stability when compared to current protein targets. Testing is performed on DNA extracts and can be incorporated into a laboratory's current workflow.

SFPD crime laboratory has done work to test the applicability of this technology with forensic samples. With the field increasing focus on testing of sexual assault kits, studies primarily focused on the semen primer. Testing sperm from epithelial fractions of a neat semen sample extracted differentially showed specificity to spermatozoa. PCR parameters were also examined to optimize the sensitivity of the protocol. Slowing ramp rates during the PCR process had a significant effect on increasing the sensitivity in regards to detection of bisulfite-converted DNA. Sensitivity studies using blood, saliva, semen, and vaginal epithelial cells were done to examine the differences in methylation values of DNA from different tissue types while also comparing the sensitivity to Globalfiler. Lastly, a study using varying mixture proportions of DNA from different tissue types was done to observe the effects on methylation values and their discriminatory power.

Update on the AAFS Academy Standards Board (ASB) Firearms and Tool Marks Consensus Body

Gregory Laskowski, Criminalistics Services International, LLC

Attendees will learn the following:

The purpose and scope of the AAFS ASB FATM Consensus Body, The make-up of the Consensus Body, Current documents under review, Future work, How to join and contribute as a member of the FATM Consensus Body.

The purpose of this presentation is to inform the audience that the American Academy of Forensic Sciences has created a standards development organization (SDO) known as the Academy Standards Board (ASB). The ASB's Firearm and Tool Marks (FATM) Consensus Body is made up of subject matter experts in the field, academics, producers, consumer groups, and parties of general interest.

The FATM Consensus Body can accept proposals for standards from individuals or groups such as the Organization of Scientific Area Committees (OSAC) or develop their own. Standards proposed, developed, and published must adhere to American National Standards Institute (ANSI) guidelines. A public review process is mandatory for any guideline or standard developed for publishing.

The ASB FATM Consensus Body is a means to ensure that guidelines and standards in the discipline of firearms and tool mark examination are produced and published that meet the expectations of the scientific community in addition to the legal community.

I Shot the Kitchen, but I Did Not Shoot the Police: An Officer-Involved Shooting Reconstruction

Gregory Laskowski, Criminalistics Services International, LLC

The purpose of this presentation is to educate the audience on the reconstruction of an officer-involved shooting investigation from a defense examiner's perspective in terms of: Reviewing case documents and photographs, Working with experts in other forensic disciplines, Examining evidence with restrictions imposed on an out-of-state examiner, Examining the crime scene years after the incident occurred, and the process of proving or disproving the defense's hypothesis.

In 2010, police officers working an undercover illegal drug sting operation engaged in a firefight with several suspects inside a residence. In a scene reminiscent of the gunfight at the OK Corral, the participants engaged in close-quarters combat, resulting in one officer killed and several wounded, including an informant. The suspects in this case also suffered casualties with one deceased at the scene and one mortally wounded. Two surviving suspects were charged in the case, one of them with capital murder as the result of the death of a police officer. The question was: Did the defendant fire the fatal rounds? This examiner was hired by the defense in 2015 and completed his investigation in 2017.

Based upon a review of numerous investigative documents and materials, this examiner was able to reconstruct the shooting events as they pertained to the represented client. The following factors were considered in reaching a conclusion:

Gunshot wounds patterns and wound pathology incurred by the police officers and their informant (terminal ballistics), The firearms and ammunition involved, Location of spent cartridge cases, and bullet path analysis, including trajectory analysis through animation.

Based upon the analysis of the evidence, the examination of the scene of the shooting, and the expert opinions of practitioners in other disciplines, it was concluded that the shooter did not cause the fatal gunshot wound to the police officer nor the non-fatal gunshot wounds to the surviving officers and the informant. In fact, none of the rounds fired by the defendant struck anyone. As a result of the work of this examiner, the capital murder charges were dropped. The defendant pled to a charge resulting in a sentence of life in prison.

A Modern Strategy for Managing Firearm Evidence Related Casework

Ronald Nichols, Nichols Forensic Science Consulting

If one looks at the history of firearm and toolmark identification, one will find a history rich in knowledge and tradition. The procedures and processes set in motion by the founding fathers of the discipline have been tested and tried and, like the comparison microscope, not much has changed from the early 20th century.

Advances in technology have allowed examiners opportunities to perform their work better in terms of photographic documentation. In addition, some agencies have even begun to use imaging technology to enhance what could traditionally be viewed on the comparison microscope and aid their comparative capabilities through virtual microscopy. At the same time, the processes and procedures for handling and managing firearm-related casework, apart from the incorporation of laboratory information management systems, has stayed pretty much the same. We have simply added more tools.

Modern technology offers an opportunity to handle and manage casework in a much different and, arguably, much more efficient and effective way, if properly implemented. With respect to firearm comparison and identification, NIBIN can be leveraged to provide laboratories with a means of triaging firearm-related evidence so that examiners are working

on the most current and relevant shooting crimes that are taking place in their regions of responsibility. It has been traditionally accepted that case severity, followed by first-in/first-out are the prioritizing factors when handling firearm-related casework. However, considering that in some regions up to 50% of the shootings that occur are related to other shootings, it is quite possible that the non-victim shooting case that has been typically relegated to the bottom of the pile of requests can hold the key to solving the homicide on the very top.

This presentation will offer some historical perspective with respect to how cases were traditionally handled so examiners can better understand the reason certain things were done and why they may no longer be necessary. Not only will this permit more streamlined analyses but it will also help set the stage for embracing a different approach, one that uses imaging technology available through NIBIN to prioritize casework instead of the typical manner in which cases are currently prioritized. With a more fully integrated approach, one that leverages technology, especially imaging technology, firearm-related cases can be conducted more efficiently and effectively. In addition, the examinations that are being conducted are far more relevant to investigators working to get active shooters off the streets.

The Murder of Lisa Valdez

Pamela Hofsass, Contra Costa County Sheriff's Office, and Heather Trevisan, San Francisco District Attorney's Office

Lisa Valdez, a 36-year-old computer programmer, was found brutally murdered in her home in the Diamond Heights area of San Francisco on May 20, 1998. With no witnesses and no motive, the police struggled to identify the killer. Due to decomposition of the victim's body, evidence was limited but not impossible to find. Thanks to the sharp eye of the Tech Lead in the DNA Unit, a unique drip pattern on a bloody pillow found at the crime scene was recognized. This evidence provided a single source, unknown male DNA profile that sat in CODIS for 13 years until a fortuitous felony arrest led to the identity of the killer.

This presentation will provide a case study that has several unique twists and turns from multiple viewpoints: the crime lab, the police, and the DA's Office. Pam Hofsass worked on the case while assigned to the DNA Unit at the SFPD Crime Lab and then again, 11 years later, as an SFPD Homicide Inspector. She initially prepared the case for a Familial Search through the DOJ CODIS Lab. Heather Trevisan, the ADA who presented the case in SF Superior Court, will also weigh in on the many surprising twists in this case, including the challenge of presenting the jury with a wide spectrum of DNA analytical methods(RFLP, DQa, PM, Pro/Co and Identifiler).

Contra Costa County Drug Presumptive Testing (DPT) Program

Dana Filkowski, Contra Costa County District Attorney's Office, and Denise Gallagher, Contra Costa County Sheriff, Forensic Services Division

Learn about Contra Costa County's successful DPT Program, initiated through a joint effort between the Crime Lab and the DA's Office in order to:

Reduce the cost of drug analysis for law enforcement agencies by having the lab perform confirmatory analysis only in those items actually needed for trial;

Ensure accurate and reliable results for filing purposes and preliminary hearings by standardizing testing protocols as well as the training and certification of officers performing the testing;

Reduce unnecessary testing and backlog at the crime lab by performing confirmatory analysis only on those items needed for trial and reducing the amount of time criminalists spent away from the lab being "115'd" for preliminary hearing testimony.

Using FTIR-ATR to Measure Bone Degradation and Crystallinity

Kelsa L. West, University of California, Davis, Forensic Science Graduate Program

In order to better understand how bone degrades, this study focuses on changes in cortical bone crystallinity after exposure to different environmental conditions. To generate cortical-bone crystallinity values, a Fourier-transform infrared spectrometer (FTIR) with an attenuated total reflectance (ATR) accessory was used. This experiment was undertaken to evaluate FTIR-ATR as a potential tool for this type of analysis, as well as to determine if bone crystallinity values are distinct enough to be used for forensic reconstruction of environmental conditions. Multivariate analysis of variance (MANOVA) supported the prediction that inter-individual variation in pig femora and that intra-individual sampling of locations across one skeletal element would not vary significantly. Additionally, MANOVA yielded significant results, suggesting that bone crystallinity is significantly altered by the environmental stressors examined in this study (fresh, frozen and thawed, exposed to medium heat, or macerated with Borax detergent). Additionally, we can conclude that changes in bone crystallinity can be detected using FTIR-ATR.

Darknet Investigation and Safe Evidence Collection Techniques

Sarah Cortes, Michelle Dilbeck, and Wansin Ounkeo, Alameda County Sheriff's Office Crime Laboratory

From narcotics to illegal weapons sales to murder-for-hire to child abuse, crime has increasingly moved to the darknet. Local San Francisco cases like Silk Road and Operation Pacifier and use of the darknet in the Snowden and Manning cases is well known. But the darknet is also increasingly being used in otherwise everyday crime at the state and local level.

In this presentation, we will explain what the darknet is and how it works. We will review Tor, the largest darknet, and some successful prosecutions of local Bay Area cases. We will also show some of the indications that may inform investigators and forensic scientists that they could be encountering a case which may extend to a larger darknet enterprise.

We will show how, at the Alameda County Sheriff's Office Digital Forensics and Multimedia Evidence (DME) unit, we have used Raspberry Pi to develop safe investigation techniques for the darknet. We will walk through the creation of a Tor hidden service like Silk Road, so forensic investigators can better understand where to find digital evidence. Attendees

will be informed as to how forensic labs can use these and other practical techniques to investigate darknet crimes.

East Area Rapist

Paige Kneeland, Sacramento County Sheriff's Department

In June of 1976, an unknown suspect sexually assaulted a resident of Sacramento County. The Sacramento County Sheriff's Department was unaware this would be the first in a series which would span ten years, fourteen law enforcement agencies, and include countless residential burglaries, forty-five sexual assault victims and twelve homicide victims.

The geographic area of the suspect's numerous attacks in Sacramento County led to his moniker, the "East Area Rapist". Two years after his first assault there, he began striking communities in the East Bay Area. In December of 1979 he moved south, killing a couple in their Santa Barbara home. At that time, the crime's connection to the East Area Rapist was unknown. Law enforcement agencies tracked his continued killings separately from the Northern California crimes, and the suspect became known as the "Original Night Stalker" as he committed eight more homicides between 1980 and 1986.

Over the years, investigators began to theorize there was a link between the northern assaults and the southern homicides. In 2001, DNA linked the "East Area Rapist" cases to the "Original Night Stalker" murders, confirming that theory. Recent developments in the investigation will be discussed, including the naming of a suspect in this case after forty years.

Mail Fraud—Internet/Reshipping/Credit Card Fraud: Tales from the United States Postal Inspection Service

Barry Mew

The United States Postal Inspection Service (USPIS) is the law enforcement arm of the U.S. Postal Services. Its jurisdiction is defined as "crimes that may adversely affect or fraudulently use the U.S. Mail, the postal system or postal employees." The seven categories of investigative services include Fraud, External/Violent Crime, Prohibited Mailings (Narcotics, Child Pornography, Mail Bombs), Aviation & Homeland Security, Revenue Investigations, International Investigations & Global Security, and Task Force Investigations with other Law Enforcement Agencies. This presentation will review various cases involving mail fraud, internet fraud, and credit card fraud. These fraudulent crimes often involve a plethora of other crimes such as narcotics, explosives, burglaries, robberies, identity theft, embezzlement, and computer hacking which also must be investigated. Pertinent evidence of forensic value will be discussed and other evidence considerations that could be involved in a local crime laboratory.

Time of Death and Current Research

Michelle Rippy, California State University - East Bay

Medicolegal death investigation is a field that does not receive much research attention or advancement, as all the subjects are deceased. Public health threats, drug epidemics, and contagious diseases are typically recognized in decedents first, with thorough and accurate investigations able to assist in epidemiology research. One component in medicolegal death investigation is determining the time of death. An accurate time of death can assist in corroborating alibies, determine the sequence of death in multiple casualty circumstances, and provide vital facts for civil situations. In the mid to late 20th century, liver temperatures were an invasive action taken by investigators to determine a decedent's core temperature, which was used to estimate an approximate time of death. Due to many variables with placement of invasive thermometers, the accuracy of liver temperatures was dispelled and this once commonplace action lost scientific support. Currently, medicolegal death investigators use three major post-mortem changes at a death scene – rigor, algor, and livor mortis. Many factors are considered in the subjective determination as to the possible time of death, including the cooling of the decedent, ambient temperature, stiffness of muscles, clothing, disease, recent exercise, and release of blood internally. When the investigator has knowledge of multiple components of the unwitnessed death, the time frame can generally only be narrowed to a 4-6 hour window. An evaluation of current time-of-death metrics will be provided and current research using non-invasive thermometers will be discussed to determine if the time-of-death window can be narrowed.

Evidence Collection and Identification of Decedents in a Large Commercial Airplane Crash

Michelle Rippy, California State University - East Bay

Major incidents can occur anywhere and at any time. Preparation for large-scale incidents can be done through policies and tabletop exercises, though it is very difficult to prepare oneself and an agency for a sizable and complex incident. An analysis of past cases can be used to reevaluate current practices and plan for future incidents. This case study will examine the crash of a Boeing 777 at the San Francisco International Airport and the resources needed to handle the large-scale case. A survey of the scene, equipment used, personnel requirements, and the creation of a family assistance center will be discussed. His presentation will also cover an in-depth analysis of evidence at the scene, collection of evidence, agencies involved, agency responsibilities, and identification of the decedents. The international work completed to assist in decedent identification will be studied as well as the process for notification of kin.

POSTER SESSION

ATR-FTIR and UV-Vis Spectroscopic Investigations on Porcine Vitreous Humor to Determine the Postmortem Interval *Amanda S Shum, Donald J Johnson, Jay Vargas, School of Criminal Justice and Criminalistics, California State University, Los Angeles.*

Does "Representative Sampling" Provide an Accurate Assessment of the Overall DNA Mixture Composition on Clothing? *Summer DeRobertis, Erzsebet Hickey, Ruth Ballard, PhD, California State University, Sacramento*

The Effects of Blood and Gunshot Residue Processing Procedures on the Microspectrophotometry of Fibers *Johnny Lei and Katherine A. Roberts, PhD, CSULA*

The Effects of Semen and Ignitable Fluid Processing Techniques on UV-Visible-NIR Microspectrophotometer Fiber Analysis *Kayla K. Balasbas, Katherine A. Roberts, PhD, California State University, Los Angeles*

Estimation of Muzzle-to-Target Distance Using Pellet Distribution Patterns from Three Shotgun Chokes *Jessica Cappelli, Manuel Muñoz, Katherine A. Roberts, PhD, CSULA*

Improving Mixture Analysis Utilizing Single Nucleotide Polymorphism (SNP) Probe Capture Enrichment and Massively Parallel Sequencing *Jessica Lim, Henry Erlich, Ph.D., Cassandra Calloway, Ph.D., UC—Davis (Forensic Science Graduate Group), Children's Hospital Oakland Research Institute*

Infrared Microspectrophotomertry Analysis of Bullet Damage in Textile Fabrics *Adrian Rendon, Katherine A. Roberts, PhD, California State University, Los Angeles*

Presumptive Identification of Heterocyclic Amines Using Photoluminescent Copper(I) Iodide *David Romo, Jay Vargas, School of Criminal Justice and Criminalistics, CSULA*

Qualitatively Analyzing QuEChERS' Ability to Extract Accelerants from Cotton-Based Fire Debris *Ashley Jess, University of California, Davis*

Recovery of Blood DNA and Contact DNA from Sink Pipes *Heather Schaller, Brett Johnson, Catherine Silva, and Ruth Ballard, PhD, California State University, Sacramento*

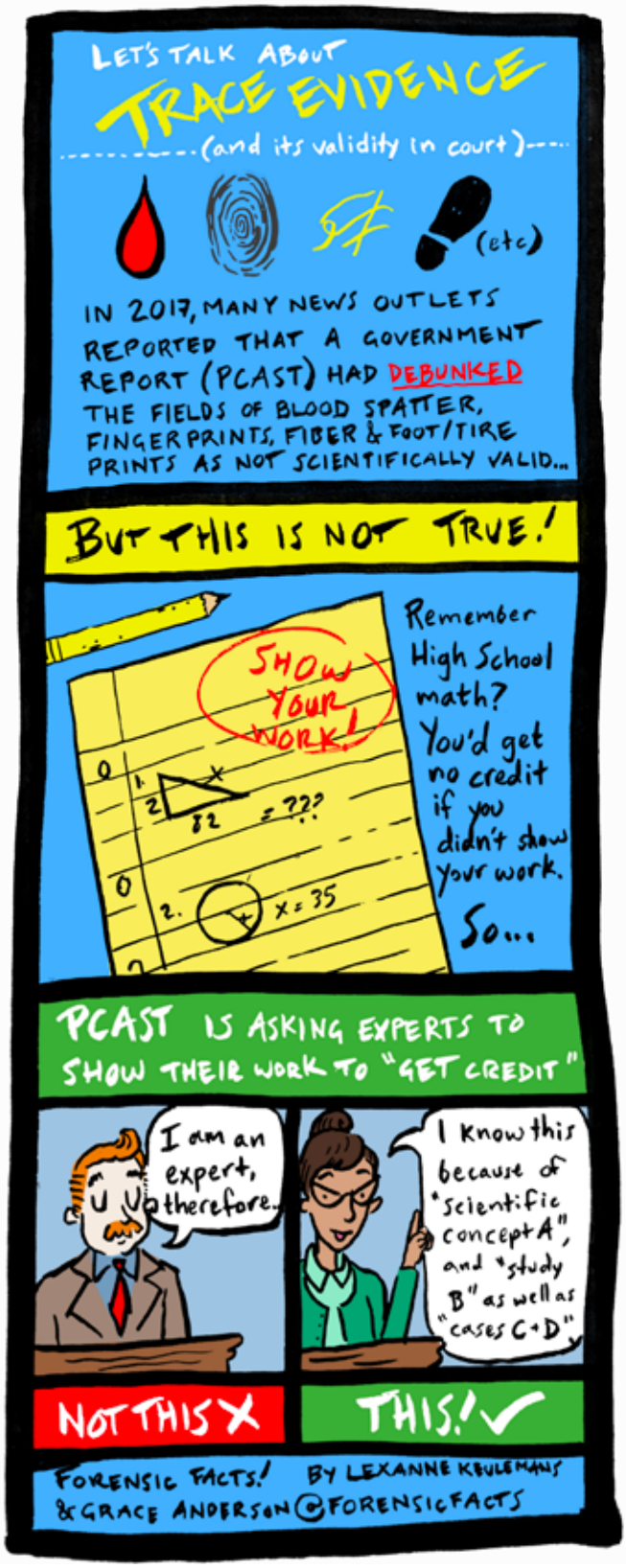
Reliability of Phenotype Estimation and Extended Classification of Ancestry for Forensic Application *Naomi A. Weisz, Katherine A. Roberts, PhD, Winters R. Hardy, PhD, CSULA*

Resolution of mtDNA Mixtures using a Probe Capture Next Generation Sequencing System and Custom Analysis Software *Mary Wisner, Shelly Shih, M.S., Henry Erlich, Ph.D., Cassandra Calloway, Ph.D., UC - Davis (Forensic Science Graduate Group), Children's Hospital Oakland Research Institute*

A Survey on the Interpretive GC/MS Analysis of Fire Debris *Anthony Parks, Jay Vargas, California State U., Los Angeles*

True Allele and STRmix: A Comparison of Two Probabilistic Genotyping Software Programs *Diana Orozco, Rasha Kiwan, Ruth Ballard PhD, Ruth Dickover PhD, California State University, Sacramento and University of California, Davis*

Forensic Facts!



Physical Aspects of Blood Traces as a Tool in Crime Scene Investigation

by Peter DeForest, D. Crim.

"The ability to select relevant information from a mass of obscuring detail, this eye for patterns half buried amongst other patterns, almost as if the build-up had been observed, is a characteristic of the accomplished investigator." —Stuart Kind

Introduction

This paper grew out of one of the documents I prepared for testimony that I gave at a hearing held by the Texas Forensic Science Commission in Austin earlier this year. The particular hearing held in January dealt with the area of "bloodstain pattern analysis (BPA)". Apparently, the Commission's focus at this particular time was prompted by concerns about a conviction and 30 year imprisonment stemming from a 1985 homicide largely based on the testimony of a police officer whose expertise was based solely on a 40 hour course in BPA he had taken just prior to being consulted. This case is discussed in a two-part article in two very recent issues of the *New York Times Magazine*[1]. I would anticipate that most lay readers of these articles would tend to form opinions about guilt or innocence. That is not the intent of citing them here. Rather it is to have criminalist readers reflect on the physical evidence based testimony offered in support of the conviction.

Although the bulk of this paper deals with BPA, this is done with the intent of treating BPA as an activity subsumed under scientific crime scene investigation and reconstruction. Such investigations need to be overseen and coordinated by scientist/generalists. What is a scientist/generalist? This is a scientist with broad knowledge of criminalistics and physical evidence. Ideally, such a scientist would have in-depth specialist knowledge and expertise in one or a limited number of relevant areas. At the time I delivered my 1997 *Founders Lecture*[2] and subsequently published *Recapturing the Essence of Criminalistics*[3], I had been concerned for many years about the vanishing generalist/scientist criminalist. The generalist criminalist model for which California was renowned 40 or 50 years ago was often derided by those from other parts of the country who were ignorant of the details of the concept. My present concern for what has been lost is greater now than it has been at any time in the 57 plus years since I started my career in the Ventura County Sheriff's Lab in 1960. Things have retrogressed in this respect. The CAC's early leadership role has been muted. Sometimes I despair that it may already be too late to recapture that which has been lost. However, that is unacceptable. Efforts need to be redoubled to restore the proper and appropriate role for the criminalist in criminal investigation.

Dr. Peter DeForest is the author of Forensic Science: An Introduction to Criminalistics, and is professor emeritus of criminalistics at John Jay College of Justice, City University of New York where he has taught for 37 years. He earned a Doctor of Criminology Degree in Criminalistics (1969) from the University of California at Berkeley, under Dr. Paul L. Kirk.

The Need for the Generalist Scientist

No two situations or cases are ever totally alike. One cannot know a priori what to expect as valuable traces. Almost anything has the potential for being a critical physical trace. Therefore, the totality of potential traces must be considered. Blood traces are only one of the possibilities, even when they are present in abundance. One cannot know at the outset of a scene investigation whether or not such traces will be even peripherally useful let alone critically important.

Current practice notwithstanding, interpreting the physical ***traces*** at a potential crime scene is a scientific problem—a very demanding scientific problem! Knowledge of natural phenomena, extensive experience and a high level of proficiency with hypothesis development, hypothesis testing and scientific reasoning are all necessary. Note, the terms "trace" or "traces" are used here as nouns and not as adjectives. They refer to one or more physical ***vestiges*** or ***remnants*** of a past event rather than specifying matter in small amounts or sizes. The task deals with additional difficult challenges. Time available is often limited. There is usually "no second bite at the apple" once the scene is released. Unrecognized evidence is "lost and gone forever," and in addition, some traces may degrade or essentially disappear with time. This all-important activity is inherently a very difficult one. It demands the best of scientists. As I wrote earlier:

> **"Competency evaluated using "kindergarten" level pattern classification doesn't address competency with respect to the higher level reasoning necessary for considering the totality of the evidence or traces at the scene and arriving at a reconstruction of the event.**

"It would not be an exaggeration to assert that crime scene investigation ranks with the most intellectually challenging and difficult of human activities. It is also one of the most misunderstood. In practice, crime scene investigation is rarely carried out efficiently and effectively. Successful outcomes, when and where they occur, are often fortuitous rather than following from intelligently adaptive plans or designs.

There seems to be an inexplicable disconnect in the public's perception of the problem of crime scene investigation. In fictional portrayals dating from the Sherlock Holmes stories of Sir Arthur Conan Doyle, to the present, the interpretation of physical clues at a crime scene is seen as the epitome of intellectual prowess. Judging from the allocation of expertise and resources, this is a far cry from the importance accorded this activity in the real world today[4]"

I ask the question: at present, is a criminalist in the laboratory, reactively testing items selected by a non-scientist investigator at a crime scene, acting as a technician or a scientist? This is a diagnostic question which normally elicits a useful diagnostic answer. In a related question: who should be

defining the scientific problems that the criminalist is tasked with routinely? Should a non-scientist be circumscribing and defining problems for a scientist to pursue? In what other scientific field does this take place? Carol Hunter, in a *CAC News* article[5] about 20 years ago, introduced the supremely appropriate term ***conductor*** to describe the problem-solving generalist/scientist who coordinates and oversees the scientific efforts in a case.

Certainly, the recommendations of the report of the National Research Council of the National Academy of Sciences recognized that there were problems in terms of "expert" opinions being offered without a scientific basis in the area of BPA. Crime scene investigation generally did not receive much attention. With respect to both BPA and the general scientific problem of crime scene investigation, the seriousness of this current situation existing in our justice system cannot be over emphasized. The lack of the necessary scientific expertise creates problems with respect to poor investigations along with naïve interpretations and erroneous testimony. In addition to critical traces going unrecognized and remaining at the scene, the laboratory may be overloaded and tasked with the analysis of irrelevant items.

Unfortunately, there are no comprehensive research data on the situation. I have consulted and testified for both prosecution and defense in such cases for over four decades in all parts of the country. I have seen shockingly poor and inaccurate work first hand. I have learned a great deal from the discouraging observations I have made. However, I am fully aware of the limitations in drawing lessons from my experience. My anecdotal accounts are no substitute for research data. However, they are informative and certainly suggest much is amiss in this area. My experience is certainly supportive of the need for further attention and correction. I think that it may be a representative microcosm of the larger situation.

The Current Situation with Respect to Blood Traces

Early in my teaching career I alerted students to the fact that there was much in the way of blood trace configurations at crime scenes that wasn't being recognized as being significant and useful in understanding how events at crime scenes took place. Initially, when I became aware of the emergence of week-long courses being offered dealing with the recognition of blood pattern configurations at crime scenes, I was encouraged that this would rectify the problem and enhance the level of awareness of and an appreciation for the value the physical aspects of blood traces in scene investigations. Unfortunately, rather quickly, it became apparent that these courses created many more serious problems than they resolved.

The role of the "40 hour course" in creating the current situation:

In my opinion most of the problems we see currently with the serious problems with interpretation and testimony in the in the area of bloodstain pattern interpretation can be laid at the feet of the history with the 40 hour courses and their proliferation. I have identified three major pernicious consequences stemming from these in the current landscape as follows:

Pernicious Consequence #1: Early on, the 40 hour courses gave attendees false confidence that they had become experts in the area as a result of attending. This created a large number of instant experts. I don't know of any attendees or "students" that failed to pass such a course. What might have been effective as a consciousness raising awareness experience relative to the value of blood trace configurations at crime scenes cannot have produced qualified experts. Attendance in these courses bred such confidence among some of the attendees that some hung out a shingle and, incredibly, began offering courses of their own.

Pernicious Consequence #2: The courses have created the indelible impression that blood trace configuration interpretation is a standalone activity rather than its more appropriate role as being one tool among many, even more powerful ones, in the armamentarium of scientific crime scene investigator. There are both theoretical and practical reasons why the investigation of blood trace configurations must be seamlessly integrated with the overall crime scene investigation. This is reflected in the title selected for this paper and will be discussed in more detail below.

Pernicious Consequence #3: The courses had no criteria for admission. Many, or perhaps most, attendees had not completed any university course work let alone earned four-year undergraduate or graduate science degrees. The acceptance and proliferation of the 40 hour courses then led to the formation of a professional association (the IABPA) where the principal entry requirement for admission was the completion of a 40 hour course irrespective of the applicant's education. This further cemented the naïve, erroneous and destructive conceptualization of bloodstain pattern interpretation as being a standalone specialty or activity that did not require scientific expertise.

The development of expertise in scientific crime scene investigation must start with a sound scientific education. The actual major may be relatively unimportant as long as the degree is a traditional science degree. Science degrees are hierarchical. Second level courses have prerequisites. Third level courses have sophomore courses as prerequisites. For example, a junior level course such as physical chemistry cannot be taken without having previously enrolled in and passed full-year course sequences in at least general chemistry, organic chemistry, calculus and physics. The FEPAC guidelines for forensic science programs could be used as **minimum** criteria for evaluating science degrees. Despite the protestations of practitioners supportive of the status quo in BPA, it needs to be appreciated that the substitution of a 4-year degree with some science courses is not a meaningful equivalent of a science degree. Science degree programs are very challenging and unfortunately have a high failure or dropout rate. Many, if not most, of those who don't succeed in the science area are not necessarily academic failures. They change majors, they graduate and have successful careers in another field. Not everyone is cut out to be a scientist. During my tenure the undergraduate program in forensic science at John Jay College/CUNY had a non-completion rate of between about 80 and 85%.

The Future

Although the outline of what needs to be done should be clear, the profound change required cannot be effected overnight. Under the best of circumstances there are many obstacles to be overcome. There is an entrenched turf retention mentality among most extant non-scientist investigators. Intense pushback can be expected. In addition, I am not aware of any existing viable alternative to adopt quickly. To my knowledge there is no cohort of educated and experienced scientists to readily step into the breach. In addition, there are science graduates who would not relish the idea of going to

crime scenes at all hours of the day. However, doing nothing will perpetuate the problem for many more years. The ultimate goal of having experienced generalist/scientists with supervisory authority among essential first responders at the crime scene should be established with various interim measures utilized until the ultimate goal can be realized.

The long anticipated and welcomed federal aid for improvements in forensic science was funded through an existing federal agency contrary to the recommendations of the Report of the National Academy of Sciences, National Research Council (NRC). The report recommended the creation of a new federal institute to be called the National Institute of Forensic Science (NIFS). Instead of the creation of an NIFS the much needed funding was routed through the existing National Institute of Standards and Technology (NIST). In my view this was a huge mistake. An example is the structure of the Organization of Scientific Area Committees (OSAC) set up by NIST. It would appear that the organizers were influenced by the perception that BPA is and should be a standalone subcommittee of the OSAC. This was mentioned earlier as one of the pernicious consequences of the 40 hour courses. To compound matters further there was no subcommittee for crime scene investigation and reconstruction. Much later when this omission became evident, crime scene investigation and reconstruction was placed under one of the existing OSAC subcommittees titled Death Investigation. This absurdity was apparently not evident to the organizers of the OSAC.

Competency evaluated using "kindergarten" level pattern classification doesn't address competency with respect to the higher level reasoning necessary for considering the totality of the evidence or traces at the scene and arriving at a reconstruction of the event. Shockingly, at least to me, the OSAC BPA subcommittee of which I was a member for over two years before I resigned never got beyond the level of pattern classification. The fact is that meaningful competency evaluations cannot be accomplished at present without having a senior scientist go through the entire process of developing a reconstruction from either a case being used for training or for ongoing proficiency testing of people reporting on casework. Current claims of an effective peer review process are evidence of wishful thinking and are illusory.

A huge added benefit of gradually replacing bloodstain pattern technicians with experienced generalist/scientists, would be the unleashing of the full potential provided by the recognition and utilization of additional available, and perhaps much more informative, traces at a crime scene. The generalist/scientist would recognize the important evidence and know which specialists to assign to specific areas of the subsequent laboratory analyses. Many if not most of the narrowly trained BPA specialists would be of no value when faced with this challenge There is no substitute for defining and circumscribing the scientific problems to be analyzed later in the laboratory at the outset of the investigation at the scene. This opportunity is often forfeited.

The primacy accorded bloodstain pattern analysis at a crime scene has distorted the public's perception and even the perception of many forensic scientists regarding its importance it may have held back the overall development of scientific crime scene reconstruction.

It is to be hoped that the realization of the importance of the generalist/scientist in a position of authority at the crime scene from time zero with respect to the criminal investigation will prevent the loss of evidence due to many well entrenched current practices. Body coverings and body bags are used nearly universally, but it should be appreciated that they are very destructive of trace evidence. In homicide cases the body is another important item of evidence. The traces associated with it can be extremely important but risk being, and are, commonly destroyed. Generalist scientists should be in charge of the body in homicide cases at the scene until it is made available to forensic pathologists at the time of autopsy. Traces are commonly compromised or destroyed at autopsy.

In the author's experience in analyzing many crime scenes over the course of several decades, there have been only a limited number of occasions when reconstructions based solely on the physical configuration of blood deposits were the key to the reconstruction. Much more often other traces were of more value.

I hope to generate discussions. I am including a short survey at the end of this article to elicit an understanding of the experience along with the opinions of criminalists in California laboratories on the issues raised here.

For those who see the author as an old man who is hopelessly out of date, I would point out that I am not the sole purveyor of this philosophy and view. There are many highly respected scientists from around the world who share the same view regarding the need for science at the crime scene. And have co-presented and have served on panels with me. These would include: Dr. Rebecca Bucht, Finnish National Forensic Science Laboratory, Dr. Patrick Buzzini, Sam Houston State University, Dr. Frank Crispino, University of Quebec, Trois Rivières, Dr. Douglas Lucas, former director of the Province of Ontario Forensic Science laboratory, Dr. Pierre Margot, Professor emeritus, University of Lausanne, Lausanne, Switzerland, Dr. Michelle Miranda, Farmingdale University, SUNY, Dr. Peter Pizzola, former director of the New York City Police Laboratory, Dr. Claude Roux, Distinguished Professor, University of Technology, Sydney, Australia and President of the International Association of Forensic Sciences (IAFS) 2018-2021, and Dr. Sheila Willis, retired director of the Irish national Forensic Science laboratory, among others.

The CAC's own Carol Hunter, now retired, who has eloquently expressed the same fundamental philosophy in the millennial edition of the *CACNews*. It bears re-reading and in this way, will reach a new generation of criminalists. *[See Criminalistics in the New Millennium, following this article.]*

Paradoxically perhaps, the way forward is to re-examine and draw wisdom from practices of the past. I am fully aware that what I am proposing is a sea change. Doing what needs to be done will not be a trivial undertaking. At the same time, despite the obstacles to achieving the desired end, it must be pursued and accomplished. Laws may have to be changed in some jurisdictions. Such laws are out of date and were made in an earlier era before scientific expertise had been developed. Scientists with experience at scenes need to have authority over all physical evidence including the victim's body, if one is present, up until the time it is delivered to the forensic pathologists for autopsy.

A comparison of crime scene investigation and fire scene investigation can be useful. Historically, investigations at both kinds of scenes have been dominated by investigators lacking scientific backgrounds. It has been difficult to articulate a rationale justifying the need for scientists for carrying out the investigations at these scenes. However, more recently noticeable progress with respect to improved scientific expertise in fire scenes is evident. This is attributable to two factors.

First, committees operating with the National Fire Protection Association or NFPA have set standards, which have gradually evolved to be more rigorous. The second influence relates the fact that it is easier to see the connection between scientific knowledge and fire phenomena. There are still non-scientist fire investigators, but they are becoming relatively less numerous. With respect to non-fire scene investigations it is much harder for non-scientist policy makers to recognize the need for scientific expertise. However, paradoxically, many more natural phenomena may be involved in producing the traces from those among the boundless possible range that might be expected at a crime scene.

The approach to the recognition of relevant physical traces cannot be formulaic. It must be continually developed and refined *de novo* using the scientific method. In addition to the fundamental science education the scientific investigator must also have both detailed training and extensive experience with crime scenes.

"Nothing shall be neglected and the first notion to be inculcated to the investigator is that he shall not limit himself discovering what he usually sees in the average case, but he needs to turn his mind toward the discovery of new facts." —*Edmond Locard*

* * *

Informal Survey or Questionnaire

At the risk of being seen as preachy, I would ask present day criminalists to consider a few questions:

Your Own Laboratory Experience

1. What do you know of the early history of your laboratory? Do you know in what year it was founded?

2. Were the founding criminalists responsible for major crime scenes at that time?

3. Do members of your laboratory currently respond to crime scenes? If so, do they have authority and control of the scene? Are they in charge of the investigation of physical traces at the scene? Or are they present at the behest and request of detectives?

Scene Control and Evidence Integrity Concerns

4. Is the scene secured at the outset? Is a procedure in place to control scene access? Are there typically any personnel inside perimeter of the crime scene who do not have a specific physical evidence expertise and function?

5. Does your agency have facilities for providing audio and video feeds to officials who remain outside the scene but have a need to know some details beyond idle curiosity?

6. Are police "brass" and prosecution attorneys kept out of the scene during the critical physical trace investigation?

Resident and Outside Experts

7. Does your institution have expertise and offer services for reconstructions based in part on interpretations of the configuration of blood trace deposits (Bloodstain pattern interpretations) at crime scenes?

8. Does the prosecutor's office in your jurisdiction draw on expertise in your laboratory for reconstructions based on blood traces?

9. Does the Prosecutor's office bring in outside "experts" for such cases?

10. Does the prosecutor's office bring in outside "experts" for such cases, even when the requisite expertise is available locally?

11. In either of these case situations is the laboratory consulted regarding the vetting of such outside experts?

Body Bags and Body Coverings

12. Do you have experience with cases where the evidence you were to examine in the laboratory was compromised by the use of body coverings and body bags?

13. In your experience how commonly encountered, are such situations?

Please feel free to email your responses to me at:
prdeforest@gmail.com

Footnotes

1 https://nyti.ms/2x7bJqt

2 http://www.cacnews.org/training/lectures/100197_deforest.shtml

3 De Forest, PR. Recapturing the Essence of Criminalistics. Science & Justice 1999; 39(3): 196-208.

4 De Forest, P.R., "Crime Scene Investigation", in Encyclopedia of Law Enforcement, L. Sullivan, ed., Sage Publications, Thousand Oaks, CA, 2005, pp. 111-116.

5 Hunter, C., Criminalistics in the new Millennium, *CACNews,* The California Association for Criminalists, First Quarter (2000): 21-22

Criminalistics in the New Millennium

*Essay by Carol Hunter**

What will this new Millennium bring to our profession? Where is criminalistics headed?

I think that we will wake up January 1, 2000, it's a Saturday by the way, and nothing will look immediately different. I think that if we are not careful, we will be lulled to continue on our current pathway. What is that pathway? Here is my own perspective. Why are you hearing from me, and who am I to give a perspective on the future of criminalistics? Here is my story. It is a window in the history of criminalistics in this country. Look through this window to the past briefly before we look into the looking glass of the future.

Criminalistics in the 70's: I'm originally from a government laboratory which was initially funded with LEAA money. I was a lucky recipient of LEAA free training in the 70's in the areas of forensic serology and microscopy courses at McCrone Research. There were still free classes at the FBI in Quantico. In other words, the government was committed

*Reprinted from the *CACNews* First Quarter, 2000.

to bringing the United States into the world playing field in criminalistics. Talk to your colleagues in my age group (we're in our late 40's, early 50's), and you will hear more of this story.

It was an era of newly trained microscopists. This meant that it was a significant era for trace evidence. Think of a few of the famous cases in forensic science…The Hillside Strangler, the Freeway killer, Wayne Williams, and trace evidence comes to mind. Hairs, fibers; transfers, primary and secondary.

It was a giant era of newly-trained forensic serologists. The introduction of a multisystem designed to give genetic results from eight different genetic markers from minimal sample within one long day's work. We were finally characterizing blood and semen beyond just ABO and Rh systems. Getting these test results into the court systems did not come without battle scars. These battles, learning how to express the scientific foundation for protein genetic markers from dried bloodstains, offered the foundational ground work for the court battles for DNA in the 80's.

"If we allow our profession to continue down the pathway toward specialization at the expense of our generalist, I fear that we will be leading ourselves toward extinction. Sound too extreme? Who will be the individual overseeing the entire perspective of the case? The investigator? The prosecutor? The defense attorney?

Ah, the 80's. The continuation of the genetic systems and trace evidence analysis of the 70's. But also, the advent of DNA technology, laboratory accreditation, certification, specialization. Criminalistics grew up from the 70's teenager to an 80's young adult. Major growth pains. But a positive progressive development, and selfguided as well. This led criminalistics sturdily into the 90's. But in the 90's, we develop other growth pains.

Laboratories have grown, doubled and tripled in size. Those criminalists that profited from all of the LEAA training in the 70's now found themselves in middle and upper management. When did the management training come into play??? Several university forensic science programs folded. Funding for training waned, Who is training our future criminalists? As laboratories grow, new facilities are needed, personnel expenses expand, and capital costs explode. Priorities in the financial arena seem to be upside-down.

Technology, especially in the molecular biology circles, expands exponentially. The hands on DNA of yesterday will soon be robotics of tomorrow. DNA uniquely characterizes a biological material. Gee, why bother with the fibers, shoeprints, physical matches and all of that extraneous stuff? National DNA advisory boards and technical working groups (made up of our peers) tell us that we must have Ph.D. molecular biologists heading our DNA laboratories. Specialization has arrived in DNA and a model laboratory staff structure is defined, which included stringent educational requirements beyond the levels currently expected for analysts already employed.

Technical working groups become scientific working groups in each of the areas within criminalistics - trace evidence, drugs, etc. Eventually the trace group subdivides (did they get too close to an endonuclease in the DNA lab group??). Taking the lead of the specialization within the sibling DNA group, the trace materials group defines a model laboratory staff structure and educational requirements which threatens to eliminate existing criminalists.

Have I set a picture? Do you begin to see the trend? So where are we headed in this new millennium? Sadly, I do not feel that we can restrain the pace of this "bullet train" ride toward specialization of analysts in criminalistics. This evolutionary change however could be an inherent error and the cause of the elimination of our species, as we once knew it.

We are surrounded by an infinite world of materials; any or all of which could end up as part of evidence on our lab bench. In order for us to recognize evidence, the analyst must have the knowledge, skills and abilities to identify and isolate these unknown material(s) as significant. This requires that the analyst acquire and maintain GENERAL KNOWLEDGE, SKILLS, and ABILITIES of all evidence categories.

Therefore, I recommend for the new millennium, that we define a NEW specialty…The GENERALIST. A criminalist that can look at the evidence as a whole and see a full picture. We need to develop and maintain the criminalist that can pick up those various pieces of the puzzle, parts of the whole spliced together by the specialist, and fit them together and create a the whole image.

Quoting Osterburg (1949) "…the laboratory investigator must visit the scene of a crime for the purpose of a general examination of the physical surroundings to discover such traces as fingerprints, footprints, bloodstains, hair, fibers, matches, bullets, shells, dust, and other indications which may point to the perpetrator."

Kirk spoke to physical evidence as a whole quite eloquently (1952) "…evidence does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong; it cannot perjure itself; it cannot be wholly absent. Only its interpretation can err. Only human failure to find it, study and understand it, can diminish its value."

If we allow our profession to continue down the pathway toward specialization at the expense of our generalist, I fear that we will be leading ourselves toward extinction. Sound too extreme? Who will be the individual overseeing the entire perspective of the case? The investigator? The prosecutor? The defense attorney? These roles represent the various advocate positions in our criminal justice system. We have worked most of our professional lives protecting the neutrality of the physical evidence. We will always need those individual criminalists with a broad understanding and general knowledge of physical evidence to maintain the overall perspective, to "direct the orchestra." There you go, think of this person as not the lead chair of any particular section, but as the conductor.

Think of criminalistics as an orchestra. Each of the specialization areas is required to play a symphony. But a conductor keeps them all together, playing the same orchestral piece, in the same time, and lets each section know when their part is required, when solo's begin, when they end. And think of the tools that we acquire, no matter how sophisticated, as a musical instrument.

Refs.

1. O'Hara and Osterburg, An Introduction to Criminalistics, 1949.
2. Kirk, Paul, Crime Investigation, 1952.

CALIFORNIA ASSOCIATION OF CRIMINALISTS
BOARD OF DIRECTORS

President:
Mey Tann

(951) 361-5000
president@cacnews.org

President-Elect:
Alice Hilker

(650) 312-5540
president-elect@cacnews.org

Recording Secretary:
Gunther Scharnhorst

(510) 620-3300
recordingsecretary@cacnews.org

Treasurer:
Helena Wong

(510) 238-3386
treasurer@cacnews.org

Regional Director: (North)
Cindy Anzalone

(650) 312-8910
northregion@cacnews.org

Regional Director: (South)
Jamie Lajoie

(323) 260-8500
southregion@cacnews.org

Membership Secretary:
Megan Caulder

(510) 620-3300
membership@cacnews.org

Editorial Secretary:
Meiling Robinson

(323) 415-8849
editor@cacnews.org

Immediate Past President:
Vincent Villena

(702) 267-4810
past-president@cacnews.org

Interested in becoming a member?

Visit us online at
www.cacnews.org

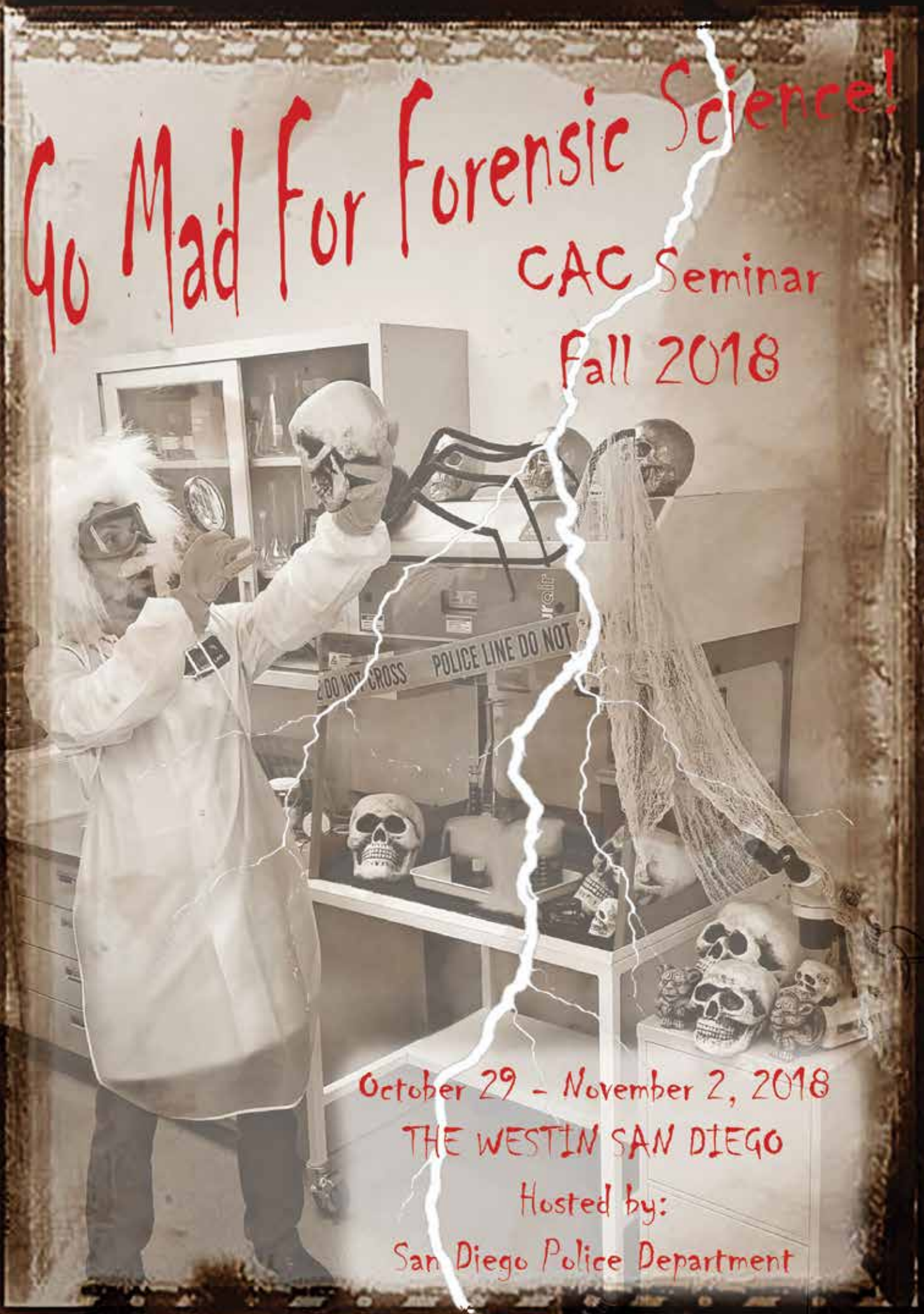
CAC QR Codes
Quick Response codes work with your smartphone to save time and typing. Point your phone's camera and visit the CAC!

CACNews.org Website

CAC Store

Go Mad For Forensic Science!

CAC Seminar
Fall 2018



October 29 - November 2, 2018

THE WESTIN SAN DIEGO

Hosted by:

San Diego Police Department